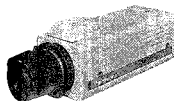


Service Manual

Color CCTV Cameras

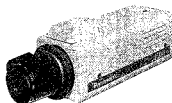
WV-CL350/WV-CL352/WV-CL354



WV-CL350



WV-CL352



WV-CL354

SPECIFICATIONS

Pick-up Device:	681(H) x 582(V) pixels, Interline Transfer CCD
Scanning Area:	6.6(H) x 4.9(V) mm (Equivalent to scanning area of 1/2" pick-up tube)
Synchronization:	Internal sync for WV-CL350/WV-CL352E/WV-CL354E Line-locked Sync for WV-CL350/WV-CL354E External Sync for WV-CL350/WV-CL352E/WV-CL354E
Scanning System:	2 : 1 Interlace
Scanning:	625 Lines/50 Fields/25 Frames
Horizontal:	15.625 kHz
Vertical:	50 Hz
Horizontal Resolution:	430 lines
Video Output:	1.0 Vp-p PAL composite, 75 ohms/BNC connector
Signal to Noise Ratio:	46 dB (AGC OFF)
Automatic Light Compensation:	ALC: 1 : 26,000 with F1.4 ALC Lens
Electronic Light Control:	Equivalent to continuous variable shutter speed between 1/60 sec. and 1/15,700 sec.
Minimum Illumination:	0.3 footcandle (3 lux) at F1.4 (AGC ON) 0.09 footcandles (0.9 lux) at F0.75 (AGC ON) with WV-LA608 lens
White Balance:	AWC/ATW selectable
Back Light Compensation:	Preset On (Factory setup) Preset Off (Manual setup at field) Photometry area is selectable (25 blocks) Signal level is adjustable
Sync. System:	Line-lock/Multiplexed VD/VBS G, L/VS (Sync Lock) is selectable 360° V-PHASE adjustment of Line-lock is available. H-PHASE adjustment in the VBS, VS, Gen-lock SC-PHASE adjustment in VBS Gen-lock mode
Electronic Shutter Speed:	Selectable 1/60 (OFF), 1/120, 1/250, 1/500, 1/1000, 1/2000, 1/4000, 1/10000

Panasonic

Lens Mount:	C-mount or CS-mount
Gain Control:	Selectable AGC ON (+14 dB) or OFF
Ambient Temperature:	-10°C - +50°C
Power Source:	WV-CL350/A, WV-CL350/B: 240V AC 50Hz, 5.5W WV-CL350/G: 230V AC 50Hz, 5.5W WV-CL352E: 12V DC, 0.39A WV-CL354E: 24V AC 50Hz, 5.3W
Dimensions (Excluding lens):	WV-CL350/WV-CL354E: 70(W) x 70.5(H) x 166(D) mm WV-CL352E: 70(W) x 70.5(H) x 141(D) mm
Weight (Without lens):	WV-CL350: 0.86 kg WV-CL352E: 0.57 kg WV-CL354E: 0.73 kg

STANDARD ACCESSORIES

ALC Lens Connector (YFE4191J100)	1pc.
Body Cap	1pc.

OPTIONAL ACCESSORIES

Lenses:	
Fixed Iris Lens:	WV-LF6, WV-LF12
Manual Iris Lens:	WV-LM4.5
Aspherical High Speed ALC Lens:	
ALC Lens:	WV-LA4510, WV-LA608, WV-LA1208 WV-LA2B, WV-LA4.5, WV-LA6, WV-LA12, WV-LA18, WV-LA36
Motorized Zoom Lens:	
	WV-LZ81/10, WV-LZ81/6A

Weights and dimensions shown are approximate.
Specifications are subject to change without notice.

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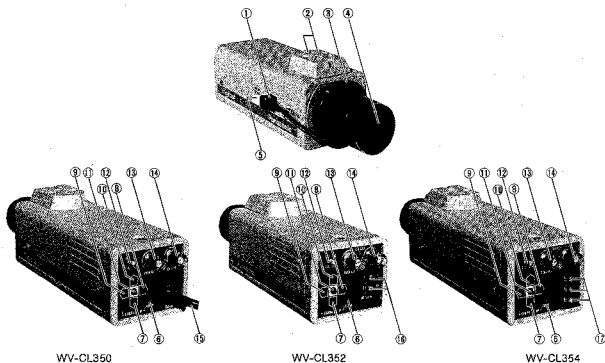
 CAUTION RISK OF ELECTRIC SHOCK DO NOT OPEN 	 This symbol warns the user that uninsulated voltage within the unit may have sufficient magnitude to cause electric shock. Therefore, it is dangerous to make any kind of contact with any inside part of this unit.
CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.	 This symbol alerts the user that important literature concerning the operation and maintenance of this unit has been included. Therefore, it should be read carefully in order to avoid any problems.

IMPORTANT SAFETY NOTICE

There are special components used in this equipment which are important for safety. These parts are indicated by the "⚠" mark on the schematic diagram and the replacement parts list. It is essential that these critical parts should be replaced with manufacture's specified parts to prevent shock, fire, or other hazards.

Do not modify the original design without permission of manufacture.

MAJOR OPERATING CONTROLS AND THEIR FUNCTIONS



1. Auto Iris Lens Connector

This connector supplies the power and either video signal or DC control signal to the auto iris lens. A 4-pin male connector to be mated with the female connector is supplied as a standard accessory (Part No. YFE4191J100).

2. Camera Mounting Screw Hole

This threaded hole (1/4" - 20) is used to mount the camera onto a mounting bracket or tripod.

3. Flange-back Adjusting Ring

This is used to adjust the back focal length or picture focus by rotating this ring to clockwise for C-mount lens or counterclockwise for special C-mount (CS mount) lens.

CAUTIONS:

1. Always set this ring to fully clockwise before mounting the lens to prevent damage of inner glass or CCD image sensor.
2. Do not turn this ring too much to counterclockwise when the C-mount lens is mounted as this could damage the inner glass or CCD image sensor.

4. Lens (Option)

See pages 5 and 6 for details on lens selection.

5. Lens Selection Switch (AUTO IRIS, DC/VIDEO)

This switch is used to select the supplied auto iris control signal to the lens from the Auto Iris Lens Connector (1).

DC:

Choose this position when the auto iris control lens requiring DC control signal such as WV-LA4510, WV-LA608, WV-LA1208, WV-LA28, WV-LA12, WV-LA18, WV-LM45, WV-LA45, WV-LA36, WV-LA6, WV-LZB1/6A, WV-LZB1/10, is mounted on the camera.

VIDEO:

Choose this position when the auto iris control lens requiring video signal, such as WV-LA8B, WV-LA16B, WV-LA25B, WV-LA50B, is mounted on the camera.

Note:

When this position is chosen, the backlight compensation is not performed.

6. Power Indicator

7. Down Switch (V)

This switch is used to move the blinking position (cursor) in the down direction.

8. Right Switch (>)

This switch is used to move the cursor in the right direction.

9. Left Switch (<)

This switch is used to move the cursor in the left direction.

10. Up Switch (^)

This switch is used to move the cursor in the up direction.

11. Set Switch

The mode selection is enabled by pressing this switch.

12. Gen-lock Termination Switch (G/L 75 ohms, ON/OFF)

When looping through a gen-lock video input signal, set this switch to the OFF position. In all other cases, set this to the ON position.

13. Video Output Connector (VIDEO)

A composite video signal is provided at this connector.

14. Gen-lock Input Connector (GEN LOCK)

A composite color, 1.0 Vp-p/75 ohms video signal, black burst, 0.3 Vp-p/75 ohms signal or composite sync signal should be supplied to this connector for external synchronization.

15. Power Cord**16. 12V DC In Terminal (DC 12V IN)**

This terminal accepts 12V DC power source (10.5V-16V).

17. 24V AC In Terminal (AC 24V IN)

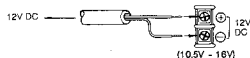
This terminal accepts 24V AC power source (19.5V - 28V). Be sure to connect grounding lead to the GND terminal.

CONNECTION**A. WV-CL350**

1. Connect the AC Power Cord (15) to a local electrical outlet.

B. WV-CL352E

1. A power supply of 12V DC is required.
2. Connect the power cable to the 12V DC Power Terminal (16) on the rear panel of the camera.



Resistance of copper wire (at 20°C)

Copper wire size (AWG)	#24 (0.22mm ²)	#22 (0.33mm ²)	#20 (0.52mm ²)	#18 (0.83mm ²)
ohms/ft	0.257	0.165	0.099	0.059
Resistance ohms/m	0.078	0.050	0.030	0.018

- Calculation method of maximum cable length between camera and power supply.

$$10.5V DC \leq V_A - (R \times 0.42 \times L) \leq 16V DC$$

L: Cable length (meter)

R: Resistance of copper wire (ohms/meter)

V_A: DC output voltage of power supply

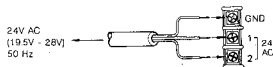
$$L_{\text{standard}} = \frac{V_A - 12}{0.42 \times R} \text{ (Meter)}$$

$$L_{\text{minimum}} = \frac{V_A - 16}{0.42 \times R} \text{ (Meter)}$$

$$L_{\text{maximum}} = \frac{V_A - 10.5}{0.42 \times R} \text{ (Meter)}$$

C. WV-CL354E

1. A power supply of 24V AC 50Hz is required.
2. Connect the power cable to the 24V AC In Terminal (17) on the rear panel of the camera.



Recommended wire gauge sizes for 24V AC line.

Copper wire size (AWG)	#24 (0.22mm ²)	#22 (0.33mm ²)	#20 (0.52mm ²)	#18 (0.83mm ²)
Length of Cable [Approx.] [ft]	314	495	842	1403
[m]	95	150	255	425

LENSES

1. Selection of Lens

<Auto Iris lenses>

Specifications	Models	WV-LA28 (Super Wide Angle)	WV-LA45 (Super Wide Angle)	WV-LA6 (Wide Angle)	WV-LA12 (Standard)	WV-LA18 (Telephoto)	WV-LA36 (Telephoto)	WV-LZ81/5A (Motorized Zoom)	WV-LZ81/10 (Motorized Zoom)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)							
Focal Length		2.8 mm	4.5 mm	6 mm	12 mm	18 mm	36 mm	8.5 - 51 mm (6X)	8 - 80 mm (10X)
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.4	1 : 1.8	1 : 1.2 (Wide) 1 : 1.3 (Tele)	1 : 1.4 (Wide) 1 : 1.7 (Tele)
Angular Field of View	H	107.0°	70.1°	54.5°	29.0°	20.4°	10.2°	41.9° (Wide) 7.2° (Tele)	44.6° (Wide) 4.6° (Tele)
	V	89.0°	55.0°	42.5°	22.0°	15.2°	7.7°	31.3° (Wide) 5.5° (Tele)	33.5° (Wide) 3.5° (Tele)
Focusing Range	Adjusted by camera	0.92 (ft) - ∞ 0.3 (m) - ∞		0.92 (ft) - ∞ 0.3 (m) - ∞	0.89 (ft) - ∞ 0.27 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞	3.3 (ft) - ∞ 1 (m) - ∞	3.8 (ft) - ∞ 1.1 (m) - ∞	3.8 (ft) - ∞ 1.1 (m) - ∞
Mount		Special C mount (CS mount, 1" - 32UN)							
Filter Size		None	φ37.5 mm P = 0.5	φ37.5 mm P = 0.5	φ37.5 mm P = 0.5	φ37.5 mm P = 0.5	φ37.5 mm P = 0.5	φ49 mm P = 0.75	φ55 mm P = 0.75
Dimensions		φ1-11/16" x 1-5/16" (φ43x34mm)	φ1-11/16" x 1-5/8" (φ43x41mm)	φ1-11/16" x 1-5/8" (φ43x41mm)	φ1-11/16" x 1-5/8" (φ43x41mm)	φ1-11/16" x 1-5/8" (φ43x41mm)	φ1-11/16" x 1-5/8" (φ43x41mm)	3-3/8"(W)x2-7/16" (1)x3-7/8"(D) (66W)x82(1)x96(2)mm	3-3/8"(W)x2-7/16" (1)x3-7/8"(D) (86W)x82(1)x96(2)mm
Weights (lbs.)		0.15 (65 g)	0.18 (80 g)	0.17 (75 g)	0.14 (65 g)	0.15 (70 g)	0.18 (80 g)	0.82 (420 g)	0.99 (450 g)

- * Dimensions and weight indicated are approximate.
 * Specifications are subject to change without notice.

<Auto Iris lenses>

Specifications	Models	WV-LA4510 (Super Wide Angle)	WV-LA608 (Wide Angle)	WV-LA1208 (Standard)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)		
Focal Length		4.5 mm	6 mm	12 mm
Maximum Aperture Ratio		1 : 1.0	1 : 0.75	1 : 0.8
Angular Field of View	H	73.2°	57.5°	31.7°
	V	56.9°	43.9°	23.6°
Focusing Range		Adjusted by Camera		
Mount		Special C mount (CS mount, 1" - 32UN)		
Filter Size		None	φ46, P = 0.75	φ46, P = 0.75
Dimensions		φ1-11/16" x 1-11/16" (φ43 x 43 mm)	φ2-1/16" x 2-1/8" (φ52 x 55 mm)	φ2-9/16" x 2-7/8" (φ66 x 72.5 mm)
Weights (lbs.)		0.2 (85 g)	0.3 (155 g)	0.6 (255 g)

- * Dimensions and weight indicated are approximate.
 * Specifications are subject to change without notice.

<Manual and fixed lenses>

Specifications	Models	WV-LM4.5 (Super Wide Angle)	WV-LF6 (Wide Angle)	WV-LF12 (Standard)
Image Size		1/2" (6.4 (H) x 4.8 (V) mm)		
Focal Length		4.5 mm	6 mm	12 mm
Maximum Aperture Ratio		1 : 1.4	1 : 1.4	1 : 1.4
Angular Field of View	H	70.1°	56.7°	29.8°
	V	55.6°	43.5°	22.3°
Iris		Manual	Fixed	Fixed
Focusing Range		Adjusted by Camera		
Mount		Special C mount (CS mount, 1" - 32UN)		
Optional Filter Size		φ37.5 mm, P = 0.5	φ34 mm, P = 0.5	φ34 mm, P = 0.5
Dimensions		φ1-11/16" x 1-9/16 po (φ43 x 41 mm)	φ1-7/16" x 1-9/16" (φ38 x 41 mm)	φ1-7/16" x 1-9/16" (φ38 x 41 mm)
Weights (lbs.)		0.22 (100 g)	0.08 (36 g)	0.077 (33 g)

- * Dimensions and weight indicated are approximate.
 * Specifications are subject to change without notice.

SETUP PROCEDURE

1. SETUP MENU

This camera utilizes various user setup menu using on-screen character display.
 This setup menu is structured as a tree-type menu as shown in Fig. 1.
 This menu is described in the following section 3. "SETUP MENU DESCRIPTION" in detail.

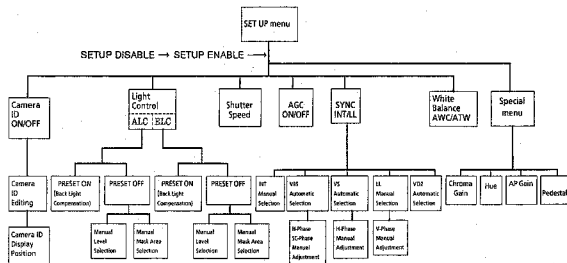


Fig. 1

All setup operations are performed by the following switches on the rear panel:

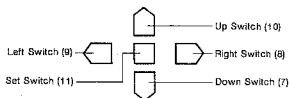


Fig. 2

Up Switch(10): The cursor moves upwards.

Down Switch(7): The cursor moves downwards.

Right Switch(8): The cursor moves right. The mode is selected by this switch. The adjustment of certain levels can be made by this switch.

Left Switch(9): The cursor moves left. The mode is selected by this switch. The adjustment of certain levels can be made by this switch.

Set Switch(11): The mode is set by this switch. The menu is changed by this switch.

2. SETUP ORDER

When the camera setup is required, proceed it according to the following steps.

- (1) Display the "SETUP" menu. (See page 17 for description and page 10 for procedure)
- (2) Camera Identification setting. (See page 7 for description and page 11 for procedure)
- (3) Auto Light Control/Electronic Light Control setting. (See page 7 for description and page 12 for procedure)
- (4) Shutter speed setting. (See page 9 for description and page 12 for procedure)
- (5) Gain Control setting. (See page 9 for description and page 12 for procedure)
- (6) Synchronization setting. (See page 9 for description and page 13 for procedure)
- (7) White Balance setting. (See page 9 for description and page 16 for procedure)
- (8) Camera mounting. (See page 16 for procedure)
- (9) Focus or Flange-back adjustment. (See page 16 for procedure)
- (10) Backlight Compensation setting. (See page 8 for description and page 17 for procedure)
- (11) Special Menu setting. (See page 10 for description and page 19 for procedure)

3. SETUP MENU DESCRIPTION

3-1. Camera Identification (CAMERA ID)

Up to 16 of alphabetic/numerical characters for camera identification characters can be displayed on the bottom line of the picture.

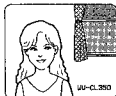


Fig. 3

The ID display ON or OFF can be chosen by the primary setup menu and the editing of displayed characters is made available in the secondly submenu.



Fig. 4

Note:

Refer to the SETUP OPERATION section for detailed procedure.

3-2. Light Control (ALC / ELC)

The video output level corresponding to the incoming light level can be controlled by either the lens iris (Auto Light Control (ALC)) or the CCD image sensor (Electronic Light Control (ELC)) by this menu.

The auto iris lens (ALC type lens), such as WV-LA4.5, WV-LA4510, WV-LA6, WV-LA608, WV-LA12, WV-LA1208, WV-LA18, WV-LA36 etc., is rather recommended to use with the "ALC" position to have wide incoming light control range.

The fixed iris lens, such as WV-LF6 or WV-LF12, or manual iris lens such as WV-LM4.5 might be used with the "ELC" position under limited lighting condition.

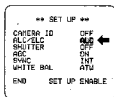


Fig. 5

In the ELC mode, a continuously variable electronic shutter is employed to automatically control the exposure times in the CCD image sensor, according to the incoming light level. With this mode selected, fixed or manual iris lens can be used instead of an ALC type lens.

Cautions:

- Under bright lighting conditions such as outdoors, use an ALC type lens as the ELC control range is not wide enough under these conditions.
- Under certain unique lighting conditions, the following phenomena may appear and should these phenomena occur, use an ALC type lens.
 - Strong smear and/or blooming on highlight objects such as spotlights or windows.
 - Noticeable flicker on the picture and/or the color rendition variations.
- When using in the ELC mode with a fixed iris lens, the depth of field of the image may be less than that obtained by using an ALC lens. Depth of field varies inversely with the iris opening. Thus, using this camera in the ELC mode with the fixed iris lens fully opened may result in less depth of field than if an ALC lens was used (and distant objects in the picture might not be in focus).

When the ELC mode is selected, the white balance control is automatically switched to the ATW mode.

As the submenu of this menu, the backlight compensation between the factory preset and manual masking area setting can be chosen as follows.

3-2-1. Backlight Compensation (BACKLIGHT COMP)

With conventional cameras, strong background lighting, such as a spotlight, interferes with the clarity of important scene objects, making them appear dark. This camera is equipped with a backlight compensation mode as the submenu of the Light Control (ALC/ELC) to overcome this problem.

As shown in the Fig. 1 SETUP MENU TREE, the factory setup mode of backlight compensation (PRESET ON) and field (manual) masking area and video output level setup (PRESET OFF) (MANUAL SET) modes are available for both the ALC and ELC modes respectively.

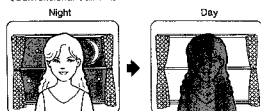
- **Factory Setup Mode (PRESET ON)**

In normal use the important object in a scene is placed in the center of the monitor's screen. In the factory setup mode, more photometric weight is given to the center of the screen (where the important object is located) than is given to the edge of the picture (where a bright backlight would most likely be located). In this mode, even though the backlight may vary, the object at the center of the screen can still be clearly seen.

Notes:

- The masking area and the video output level are factory setup in this mode.
- Refer to the SETUP OPERATION section for detailed procedure.

<Conventional Camera>



<WV-CL350 Preset ON>

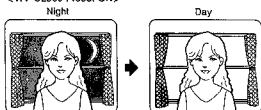


Fig. 6

- **Field Setup Mode (PRESET OFF)**

This mode is effective in conditions where the important object in the scene is not located centrally in the picture and when a bright light source is located near the center of the screen. A conventional camera cannot cope with these situations.

<Conventional Camera>

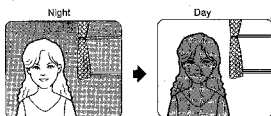


Fig. 7

However, by using the WV-CL350 in the preset "OFF" mode, it is possible to compensate for difficult lighting conditions. In this mode, the picture is divided into 25 zones or mask areas. It is possible to mask (or tell the camera to ignore) any bright light sources in those mask areas that might interfere with picture clarity.

For example, a strong spotlight in the background might cause the lens iris to close down so much that all other objects in the scene appear dark. With backlight compensation, it is possible to mask out the spotlight and increase the rest of the scene's brightness as shown below.

In addition to the field mask area setup, the overall video output level can be adjusted by using the level adjustment (LEVEL) in the preset "OFF" mode for both the ALC and ELC modes respectively.

<WV-CL350 Masked>

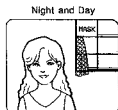


Fig. 8

Notes:

- The result of field setup of the mask area and level adjustment is fed back (effected) to the lens iris control at the ALC mode and the exposure time control of the CCD image sensor at the ELC mode.
- Refer to the SETUP OPERATION section for detailed procedure.

3-3. Shutter Speed (SHUTTER)

The electronic shutter speed can be select among the 1/80 second (OFF) and 1/100 - 1/10000 second.

Note:

Refer to the SETUP OPERATION section for detailed procedure.

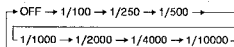


Fig. 9

3-4. Gain Control (AGC)

The gain control can be selected between the automatic gain control (AGC ON) and manual gain control (AGC OFF) by this menu.

Note:

Refer to the SETUP OPERATION section for detailed procedure.

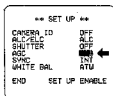


Fig. 10

3-5. Synchronization (SYNC)

The camera sync can be chosen between the internal sync (INT) and the line-lock sync (LL) mode by this menu. This camera, however, accepts a composite color video signal, black burst signal (VBS) or composite B/W (black and white) video signal, composite sync signal (VS) for the Gen-lock input signal to be supplied to Gen-lock Input Connector (14) and the sync mode selection in this case is performed automatically.

This camera also accepts the vertical drive signal multiplexed on the composite video output signal (VD2), being supplied by the Multiplex Unit WJ-MP404 etc, for a vertical interval switching on the sequential switcher. Whenever the VD2 is being supplied, sync mode selection is performed automatically.

As the submenu of this menu, the line-lock phase, gen-lock horizontal and subcarrier phase can be adjusted.



Fig. 11

Important Notice:

The priority of sync mode is as follows.

1. Multiplexed Vertical Drive (VD2) (Highest)
2. Line-lock (LL)
3. Color Composite Video or Blackburst Signal (VBS)
4. B/W Composite Video or Composite Sync Signal (VS)
5. Internal Sync (INT) (Lowest)

Note:

The sync mode selection among above modes is made according to priority. Refer to the SETUP OPERATION section for detailed procedure.

3-6. White Balance (WHITE BAL)

A color characteristic of illumination is called color temperature and it is measured in units of Kelvin (°K). The higher color temperature are considered bluish while the lower color temperatures are more reddish. A camera shooting a scene with high color temperature illumination produces a bluish picture. Likewise, it will produce a reddish picture with lower color temperature illumination. Therefore, in order for the camera to reproduce a scene accurately, it needs to be white balanced before shooting.

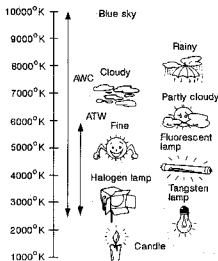


Fig. 12

The white balance control can be chosen between the auto-tracing white balance (ATW) and one-touch automatic white balance control (AWC) mode by this menu.

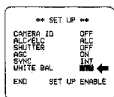


Fig. 13

3-6-1. Auto-Tracing White Balance Mode (ATW)

In the ATW mode the color temperature of the illuminant is continuously monitored and the white balance of the camera is automatically set.

The ATW mode has a range of operation from approximately 2600°K - 6000°K. Beyond this range, use the Automatic White Balance (AWC) mode.

The ATW mode might not produce optimum color rendition in the following conditions.

1. When the scene consists mostly of strongly colored objects or illumination such as a blue sky or during sunset.
2. When the scene is dimly lit.
In these cases, use the AWC mode.

3-6-2. Automatic White Balance Control Mode (AWC)

In this mode, accurate white balance may be obtained within a range of operation from approximately 2300°K - 10000°K.

Note:

Refer to the SETUP OPERATION section for detailed procedure.

3-7. Special Menu (SPECIAL)

The chroma level, chroma phase (HUE), aperture level and pedestal level of this camera can be adjusted by using this special menu.

Note:

Refer to the SETUP OPERATION section for detailed procedure.

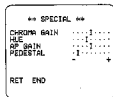


Fig. 14

4. SETUP OPERATION

Before entering the Setup menu, remember the ALL RESET operation in order to escape from the confusion of setting up the each item to the factory setup condition as follows.

- (1) Confirm that the normal camera picture is displayed and no setup menu is displayed.
- (2) While pressing both the Left Switch (<) (9) and Right Switch (>) (8) together, press the Set Switch (11) for a while in order to reset all adjustments and selections to the factory setup condition.

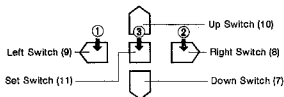


Fig. 15

Note:

While the ALL RESET mode is being processed, picture may be disturbed. This phenomenon is normal and indicating the sign of the all reset mode.

4-1. Entering Setup Menu

- By pressing the Set Switch (11) for more than 1 second, the "SET UP" menu is displayed on the monitor screen as shown in Fig. 16.

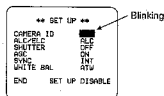


Fig. 16

- By observing this menu, you can check the current conditions.
Refer to the following sections for details of each item.
- After confirming current conditions and further resetting of each item is not required, move the cursor to the "END" position on the left bottom line and press the Set Switch (11) to return to the normal camera picture mode.



Fig. 17

Important Notice

When "SET UP DISABLE" is displayed on the bottom line of the Setup menu, you can not enter the actual mode setting. This prevents mis-operation of the mode setting.

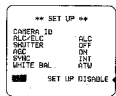


Fig. 18

- To enable the setup menu editing (resetting/readjustment), move the cursor to the bottom line by using the Up Switch (▲) (10) and Down Switch (▼) (7) and move it to the "SET UP DISABLE" position by using the Right Switch (→) (8) and Left Switch (←) (9) and press the Set Switch (11) and "SET UP ENABLE" is displayed.

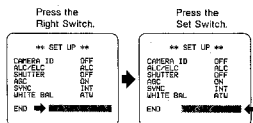


Fig. 19

- Move the cursor to the desired item to be reset or readjust through the "END" position.
- When the Special Menu is needed to be adjusted, move the cursor to the "END" position and press both the Left Switch (←) (9) and Right Switch (→) (8) together for approximately 2 seconds to display the Special Menu. (Refer to the 8. SPECIAL MENU on page 19.)

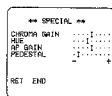


Fig. 20

Important Notice:

When the cursor is moved to the next position (next item) after changing the data (ex. ON → OFF), the latest data is written on the memory (Electronic Erasable Programmable Read Only Memory (EEPROM)) and it remains until the further data write is made even if the camera power is switched off.

4-2. Camera Identification (CAMERA ID) Setting

- Move the cursor to the "CAMERA ID" mode position, and select either "ON" (Camera Identification character is displayed) or "OFF" mode by using either the Left Switch (←) (9) or Right Switch (→) (8).



Fig. 21

- Move the cursor to the next item to write the new data into the memory.

- When the camera identification character needs editing, perform the following steps by using the submenu of Camera Identification.
- Move the cursor to the "CAMERA ID" mode position and press the Set Switch (11) to display the Character Editing menu as shown in Fig. 22.

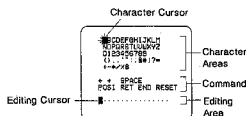


Fig. 22

- The character cursor on the letter "A" and the editing cursor on the left end of the editing area starts blinking.
- Move the character cursor to the desired letter by using the Up Switch (▲) (10), Down Switch (▼) (7), Left Switch (←) (9) and Right Switch (→) (8) and press the Set Switch (11). The selected letter is written on the editing cursor. (The blinking Editing Cursor moves to right automatically at this moment.)
- Repeat this procedure until the character editing has been completed.



Fig. 23

- When the position of the editing cursor is to be shifted on the editing area, move the character cursor to the "←" or "→" and press the Set Switch (11). This function is used to move the editing position or correct an individual character.



Fig. 24

- When a blank space is needed, move the character cursor to the "SPACE" position and press the Set Switch (11). The blank space is inserted into the cursor position on the editing area.



Fig. 25

- When all the characters in the editing area are to be erased, move the character cursor to the "RESET" position and press the Set Switch (11).



Fig. 26

- After completing the editing of the Camera Identification characters, the display position of the Camera Identification character on the monitor screen can be set as follows.
- Move the character cursor to the "POS1" position and press the Set Switch (11) to display the ID positioning menu as shown in Fig. 27 and the characters of the camera ID start blinking to identify the positioning menu for you.



Fig. 27

- The display position of the camera ID on the monitor screen can be changed anywhere on the entire screen by using the Up Switch (A) (10), Down Switch (V) (7), Left Switch (<) (9) and Right Switch (>) (8).

Notes:

- The position moving of the camera ID stops at the edges of the monitor screen.
- The camera ID moves faster when any of the Up Switch (A) (10), Down Switch (V) (7), Left Switch (<) (9) and Right Switch (>) (8) is kept pressed for more than 0.5 seconds.

- After completing the positioning of the camera ID, press the Set Switch (11) to return to the Character Editing menu as shown in Fig. 22.
- To return to the normal camera picture mode, move the character cursor to the "END" position and press the Set Switch (11).

- To return to the Setup menu for setting other items, move the character cursor to the "RET" position and press the Set Switch (11).

4-3. Light Control Setting (ALC/ELC)

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "ALC/ELC" mode position and select either the "ALC" or "ELC" mode by using the Left Switch (<) (9) or Right Switch (>) (8).

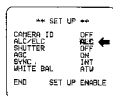


Fig. 28

- Choose the "ALC" mode when an auto iris lens (ALC lens) is used with this camera.
- Choose the "ELC" mode when a fixed iris lens such as WV-LF6 or WV-LF12 or a manual iris lens such as WV-LM4.5 is used with this camera.

Caution:

The backlight compensation setting allocated under this menu is described in the section 7 and this setting should be done after installing the camera to the site and observing the actual site picture.

4-4. Shutter Speed Setting (SHUTTER)

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the SHUTTER mode position and select the electronic shutter speed by pressing the Left Switch (<) (9) and the Right Switch (>) (8).

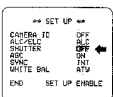
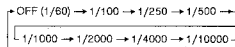


Fig. 29

The following electronic shutter speed is available.



4-5. Gain Control Setting (AGC ON/OFF)

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the AGC mode position and select either ON or OFF mode by using the Left Switch (<) (9) and Right Switch (>) (8).

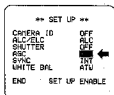


Fig. 30

4-6. Synchronization Setting (SYNC)

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the SYNC mode position and select either the line-lock (LL) or internal (INT) mode by pressing the Left Switch (<) (9) and the Right Switch (>) (8).

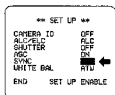


Fig. 31

Important Notice:

- The priority of sync mode is as follows.
 - Multiplexed Vertical Drive (VD2) (Highest priority)
 - Line-lock (LL)
 - Color Composite Video or Blackburst Signal (VBS)
 - B/W Composite Video or Composite Sync Signal (VS)
 - Internal Sync (INT) (Lowest priority)
- When the internal sync mode is to be used, select the INT position and no gen-lock input signal should be supplied to the Gen-lock Input Connector (14) on the rear panel.
- Whenever the multiplexed vertical drive pulse (VD2) is supplied to the camera through the coaxial cable connected to the Video Output Connector (13) on the rear panel from the Multiplex Unit WJ-MP404 etc., the camera sync mode is automatically switched to the VD2 mode regardless of the sync mode selection.
- When the VBS or VS gen-lock mode is to be used, select the INT position on this menu and supply the gen-lock input signal to the Gen-lock Input Connector (14) on the rear panel.
- The VBS gen-lock mode has a submenu of the horizontal and subcarrier phase adjustments as shown in the following section 4-6-1.

When the cable length of video output signal or gen-lock input signal is changed, the horizontal and subcarrier phase must be readjusted.

- The VS gen-lock mode has a submenu of the horizontal phase adjustment as shown in the following section 4-6-2. When the cable length of video output signal or gen-lock input signal is changed, the horizontal phase must be readjusted.
- The line-lock mode has a submenu of line-lock vertical phase adjustment as shown in the following section 4-6-3. When the camera installation is relocated, check the vertical phase adjustment again since the AC line phase may be different.

4-6-1. VBS Gen-lock Mode (EXT(VBS))

- Confirm that the cursor is on the "INT" position of the sync mode selection.

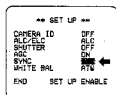


Fig. 32

- Connect the coaxial cable of the blackburst or composite color video signal to the Gen-lock Input Connector (14) and confirm that the "INT" position has been changed into the "EXT(VBS)" indication.

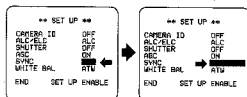


Fig. 33

CAUTION:

The gen-lock input signal should be met with the EIA RS-170A specification and should not contain jitter such as VTR playback signal as it could cause a synchronization error.

- After confirming that the cursor is on the "EXT(VBS)" position, press the Set Switch (11) on the rear panel and following phase adjustment menu is then displayed on the monitor.

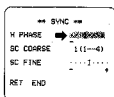


Fig. 34

- Move the cursor to the "H PHASE" mode position. The cursor "I" starts blinking.
- Connect the camera video output signal and the gen-lock input signal to a dual-trace oscilloscope.
- Set the oscilloscope to the horizontal rate and expand the horizontal sync portion on the oscilloscope.
- Adjust the horizontal phase by using the Left Switch (<) (9) or Right Switch (>) (8). The cursor "I" moves left or right. The adjustable range is 0 - 2.5 μ sec.

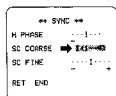


Fig. 35

- Move the cursor to the "SC COARSE" mode position for subcarrier phase adjustment. The cursor starts blinking.
- Press the Left Switch (<) (9) or Right Switch (>) (8) so that the color of the Effect Output video signal (Program Output video signal) of the Special Effects Generator (SEG) becomes the closest color of the original objects. (The SC coarse adjustment can be made for every 90 degrees (4 steps) by using the Left Switch (<) (9) or Right Switch (>) (8).)

Note:

After the fourth step, it returns to the first step.

- 1 (1 - 4): 0 degree
- 2 (1 - 4): 90 degrees
- 3 (1 - 4): 180 degrees
- 4 (1 - 4): 270 degrees

- Move the cursor to the "SC FINE" mode position. The cursor starts blinking.
- Press the Left Switch (<) (9) or Right Switch (>) (8) so that the color of the Effect Output video signal (Program Output video signal) of the Special Effects Generator (SEG) becomes the closest color of the original objects. (The fine adjustment can be made for up to 90 degrees by using the Left Switch (<) (9) or Right Switch (>) (8).)

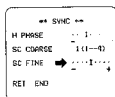


Fig. 36

Notes:

- When the cursor "I" reaches to the end of "+" position, the cursor "I" jumps to the "-" position. At the same time, the step number of the SC COARSE mode increases one step to make enable a continuous adjustment. The reverse operation takes place when the cursor "I" reaches to the end of "-" position.

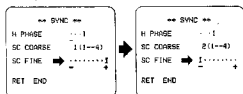


Fig. 37

- When the Left Switch (<) (9) or Right Switch (>) (8) is kept pressed for more than one second, the cursor "I" moves quickly.
- For more accurate adjustment, supply both the original camera video output signal and the Effect Output video signal (Program Output video signal) of the Special Effects Generator (SEG) to the vectorscope and compare the chroma phase for both signals.
- When both the Left Switch (<) (9) and the Right Switch (>) (8) are pressed simultaneously, the cursor "I" is reset to the factory setup position.

4-6-2. VS Gen-lock Mode (EXT(VS))

- Confirm that the cursor is on the "INT" position of the sync mode selection.



Fig. 38

- Connect the coaxial cable of the composite sync or composite black-and-white video signal to the Gen-lock Input Connector (14) and confirm that the "INT" position has been changed into the "EXT(VS)" indication.

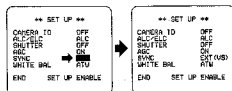


Fig. 39

CAUTION:

The gen-lock input signal should be met with the EIA RS-170 specification and should not contain jitter such as VTR playback signal as it could cause a synchronization error.

- After confirming that the cursor is on the "EXT(VS)" position, press the Set Switch (11) on the rear panel and following phase adjustment menu is then displayed on the monitor.

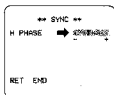


Fig. 40

- Connect the camera video output signal and the gen-lock input signal to a dual-trace oscilloscope.
- Set the oscilloscope to the horizontal rate and expand the horizontal sync portion on the oscilloscope.
- Adjust the horizontal phase by using the Left Switch (<) (9) or Right Switch (>) (8). The cursor "I" moves left or right. The adjustable range is 0 - 2.5 μ sec.

4-6-3. Line-lock Sync Mode (LL)

Note:

The line-lock (LL) sync mode is not available for WV-CL352 due to DC operation camera.

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "SYNC" mode position and select the line-lock "LL" mode by pressing the Left Switch (<) (9), and the Right Switch (>) (8). This setup can be made when the multiplexed vertical drive (VD2) pulse is not supplied to the camera.

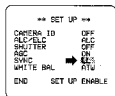


Fig. 41

- After confirming that the cursor is on the "LL" position, press the Set Switch (11) on the rear panel and following vertical phase adjustment menu is then displayed on the monitor.

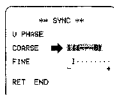
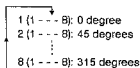


Fig. 42

- Move the cursor to the "COARSE" mode position by using the Up Switch (↑) (10) or Down Switch (↓) (7). The cursor starts blinking.
- Connect the video output signal of the camera to be adjusted and referenced camera video output signal (for example, Camera 1) to the dual-trace oscilloscope.
- Set the dual-trace oscilloscope to the vertical rate and expand the vertical sync portion on the oscilloscope.
- Press the Left Switch (<) (9) or Right Switch (>) (8) to adjust the vertical phase for both video output signal. (The coarse adjustment can be made for every 45 degrees (8 steps) by the Left Switch (<) (9) or Right Switch (>) (8).



Note:

After the eighth step, it returns to the first step.

- Move the cursor to the "FINE" mode by pressing the Down Switch (↓) (7). The cursor starts blinking.
- Press the Left Switch (<) (9) or Right Switch (>) (8) to adjust the vertical phase for both video output signal. (Fine adjustment can be made for up to 45 degrees by using the Left Switch (<) (9) or Right Switch (>) (8).)

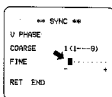


Fig. 43

Notes:

- When the cursor "I" reaches to the end of "+" position, the cursor "I" jumps to the "-" position. At the same time, the step number on the "COARSE" mode increases one step to make enable a continuous adjustment. The reverse operation takes place when the cursor "I" reaches to the end of "-" position.
- When the Left Switch (<) (9) or Right Switch (>) (8) is kept pressed for more than one second, the cursor "I" moves quickly.

- When both the Left Switch (<) (9) and the Right Switch (>) (8) are pressed simultaneously, both the coarse and fine adjustment are reset to the factory setup position. (Factory setup position is zero-crossing to AC line phase as shown below.)

Press the Left Switch (<) (9) and the Right Switch (>) (8) simultaneously.

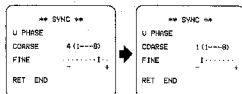


Fig. 44

- If the AC line contains noises (spike noise etc.), the vertical phase of the camera video output signal would be changed or disturbed.

4-7. White Balance Setting (WHITE BAL)

4-7-1. Auto-Tracing White Balance Mode (ATW)

- Display the Setup menu as shown in Fig. 18.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "WHITE BAL" mode position and select the "ATW" mode by pressing the Left Switch (<) (9) and the Right Switch (>) (8)

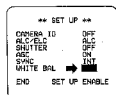


Fig. 45

No more setting up or adjustment is required.

4-7-2. Automatic White Balance Control Mode (AWC)

- Move the cursor to the "WHITE BAL" mode position and select the "AWC" mode by pressing the Left Switch (<) (9) or Right Switch (>) (8). "PUSH SW" is now displayed.

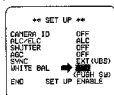


Fig. 46

- Press the Set Switch (11) to set up the white balance. The "PUSH SW" display starts blinking to indicate that the white balance is being set.

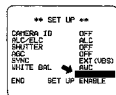


Fig. 47

- When the white balance setting is completed, the blinking "PUSH SW" stops.

5. CAMERA MOUNTING

CAUTION:

The following installation should be made by qualified service personnel or system installers.

- Mounting from the top**
This camera is originally designed to be mounted from the top, as shown in the figures. The hole is the standard photographic pan-head screw size (1/4"-20).
- Mounting from the bottom**
Remove the mount adaptor from the top of the camera by removing the two fixing screws.
- Attach the mount adaptor to the bottom as shown in the figure, then mount the camera on the mounting bracket.
- Make sure that the two original screws are used to mount the mount adaptor; other longer type screws may damage inner components.

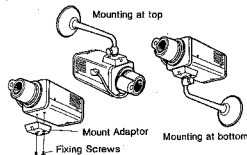


Fig. 48

6. FOCUS OR FLANGE-BACK ADJUSTMENT

CAUTION:

The following adjustment should be made by qualified service personnel or system installers.

- Loosen the screw on the flange-back adjusting ring.
- Turn the flange-back adjusting ring to the desired position.

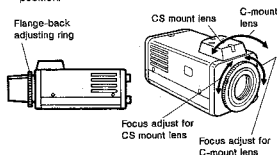


Fig. 49

CAUTION:

Do not turn this ring too much to counterclockwise as this could damage the inner glass and CCD image sensor.

- Tighten the screw on the flange-back adjusting ring.
- After setting the camera angle and picture focus, proceed to the Backlight Compensation in the following section.

7. BACKLIGHT COMPENSATION (BACKLIGHT COMP)

7-1. Auto Iris Lens with ALC Mode

- Confirm that the ALC mode is selected as follows.
- Display the Setup menu as shown in Fig. 18.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "ALC/ELC" mode position and select the "ALC" mode by using the Left Switch (<) (9) or Right Switch (>) (8).

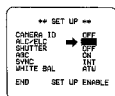


Fig. 50

- Press the Set Switch (11) to proceed to the Backlight compensation menu as shown in Fig. 51.

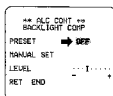


Fig. 51

7-1-1. ALC Mode with Preset Mode (PRESET ON)

- Move the cursor to the "PRESET" mode position and select the "ON" mode by using the Left Switch (<) (9) or Right Switch (>) (8). The preset mode menu is displayed on the monitor screen as shown in Fig. 52.



Fig. 52

- Move the cursor to "RET" position by using the Up Switch (Λ) (10) or Down Switch (V) (7) and press the Set Switch (11) to return to the Set Up menu.

Note:

Move the cursor to the "END" position and press the Set Switch (11) to return to the normal camera picture mode.

7-1-2. ALC Mode with Field Setup Mode (PRESET OFF)

- Move the cursor to the "PRESET" mode position and select the "OFF" mode by using the Left Switch (<) (9) and Right Switch (>) (8).
- The field setup menu is displayed on the monitor screen as shown in Fig. 53.

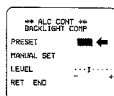


Fig. 53

- Move the cursor to the "MANUAL SET" mode position and press the Set Switch (11). The 25 Mask Areas appears on the monitor screen as shown in Fig. 54. The left top area starts blinking as a cursor.

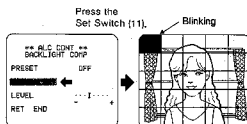


Fig. 54

- To mask this area, press the Set Switch (11). The word "MASK" appears in this area as shown in Fig. 55.

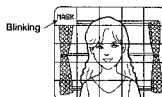


Fig. 55

- To mask other areas, move the cursor to the desired area by using the Up Switch (Λ) (10), Down Switch (V) (7), Left Switch (<) (9) or Right Switch (>) (8). The previous masked area then stops blinking and turns to white as shown in Fig. 56.

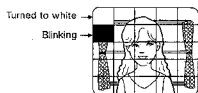


Fig. 56

- When the cursor is moved to the area where has already been masked before, the word "MASK" appears.
- Press the Set Switch (11) when this masking is to be canceled.
- After masking is completed, press the Set Switch (11) for more than 2 seconds and the 25 Mask Areas on the monitor screen disappears and the field setup menu shown in Fig. 53 is then displayed.
- When the video output level (picture contrast) is to be changed, move the cursor to the "LEVEL" mode position and press the Left Switch (<) (9) and Right Switch (>) (8) to adjust the iris of the ALC lens. The cursor "I" moves right (open) or left (close) corresponding to the video output level (iris opening).

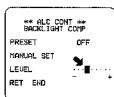


Fig. 57

- Move the cursor to "RET" position by using the Up Switch (Δ) (10) or Down Switch (V) (7) and press the Set Switch (11) to return to the normal camera picture mode.

Note:

Move the cursor to the "END" position and press the Set Switch (11) to return to the normal camera picture mode.

7-2 Auto Iris, Manual Iris or Fixed Iris lens with ELC mode

- Confirm that the ELC mode is selected as follows.
- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "ALC/ELC" mode position and select the "ELC" mode by using the Left Switch (<) (9) or Right Switch (>) (8).

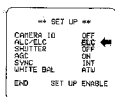


Fig. 58

CAUTION:

When an auto iris lens requiring DC control signal is used, the lens iris is fully opened in the ELC mode.

- Press the Set Switch (11) to proceed to the Backlight compensation menu as shown in Fig. 59.

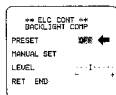


Fig. 59

7-2-1. ELC Mode with Preset Mode (PRESET ON)

- Move the cursor to the "PRESET" mode position and select the "ON" mode by using the Left Switch (<) (9) or Right Switch (>) (8). The preset mode menu is displayed on the monitor screen as shown in Fig. 60.



Fig. 60

- Move the cursor to "RET" position by using the Up Switch (Δ) (10) or Down Switch (V) (7) and press the Set Switch (11) to return to the Set Up menu.

Note:

Move the cursor to the "END" position and press the Set Switch (11) to return to the normal camera picture mode.

7-2-2. ELC Mode with Field Setup Mode (PRESET OFF)

- Move the cursor to the "PRESET" mode position and select the "OFF" mode by using the Left Switch (<) (9) or Right Switch (>) (8).
- The field setup menu is displayed on the monitor screen as shown in Fig. 61.

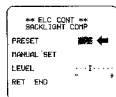


Fig. 61

- Move the cursor to the "MANUAL SET" mode position and press the Set Switch (11). The 25 Mask Areas appears on the monitor screen as shown in Fig. 62. The left top area starts blinking as a cursor.

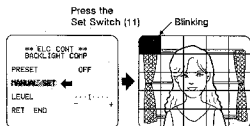


Fig. 62

- To mask this area, press the Set Switch (11). The word "MASK" appears in this area as shown in Fig. 63.

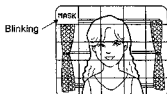


Fig. 63

- To mask other areas, move the cursor to the desired area by using the Up Switch (Δ) (10), Down Switch (V) (7), Left Switch (<) (9) or Right Switch (>) (8). The previous masked area then stops blinking and turns to white as shown in Fig. 64.

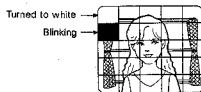


Fig. 64

- When the cursor is moved to the area where has already been masked before, the word "MASK" appears.
- Press the Set Switch (11) when this masking is to be canceled.
- After masking is completed, press the Set Switch(11) for more than 2 seconds and the 25 Mask Areas on the monitor screen disappears and the field setup menu shown in Fig. 61 is then displayed.
- When the video output level (picture contrast) is to be changed, move the cursor to the "LEVEL" mode position and press the Left Switch (<) (9) and Right Switch (>) (8) to adjust the exposure time of the CCD image sensor. The cursor "I" moves right (long) or left (short) corresponding to the video output level (exposure time).

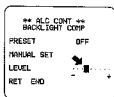


Fig. 65

- Move the cursor to "RET" position by using the Up Switch (Δ) (10) or Down Switch (V) (7) and press the Set Switch (11) to return to the Set Up menu.

Note:

Move the cursor to the "END" position and press the Set Switch (11) to return to the normal camera picture mode.

When a manual iris lens is used with the ELC mode, set the lens iris fully opened in the low lighting condition or adjust the lens iris manually in the normal room lighting condition.

Remark:

When the ELC mode is selected, the shutter speed selection is not available.

8. SPECIAL MENU

This menu allows for the customer to adjust and set the video signal of the camera to meet the customer's requirement.

- Display the Setup menu as shown in Fig. 16.
- When you begin to start with this menu, refer to 4-1. Entering Setup Menu to have display the Setup menu on the monitor screen.
- Move the cursor to the "END" position and press both the Left Switch (<) (9) and the Right Switch (>) (8) simultaneously for approximately 2 seconds. (The Left Switch (<) (9) should be pressed first.) The special menu is displayed as shown below

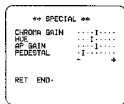


Fig. 66

8-1. Chroma Level Setting (CHROMA GAIN)

- Move the cursor to the "CHROMA GAIN" mode position. The cursor "I" starts blinking.

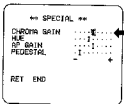


Fig. 67

- While observing the vectorscope or color video monitor, adjust the chroma level by using the Left Switch (<) (9) and the Right Switch (>) (8). The cursor "I" moves right or left.

8-2. Aperture Level Setting (AP GAIN)

- Move the cursor to the "AP GAIN" mode position. The cursor "I" starts blinking.
- While observing the colour video monitor, adjust the aperture level by using the Left Switch (<) (9) and the Right Switch (>) (8). The cursor "I" moves left (soft) or right (sharp).

8-3. Pedestal Level Setting (PEDESTAL)

- Move the cursor to the "PEDESTAL" mode position. The cursor "I" starts blinking.
- While observing the waveform monitor/oscilloscope or colour video monitor, adjust the pedestal level (black level) by using the Left Switch (<) (9) and the Right Switch (>) (8). The cursor "I" moves left (low, dark) or right (high, bright).

Notes:

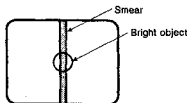
■ How to reset to factory setup

Any of the above setting plus the ALC/ELC level control and phase adjustments, can be reset to the factory setup by placing the cursor over the desired mode and then simultaneously pressing both the Left Switch (<) (9) and the Right Switch (>) (8) for more than 2 seconds.

PREVENTION OF BLOOMING AND SMEAR

When the camera is aimed towards spotlights or other bright lights or light reflecting objects, smear or blooming may appear. Therefore the camera should be operated carefully in the vicinity of extremely bright objects to avoid smear or blooming.

If the camera is aimed at the sun or very bright light, such as laser beam, for a long period of time, the CCD image sensor may be burned in and blemishes (white or black dots) appears on the picture.



CIRCUIT DESCRIPTION

1. Principle of Color CCD Camera

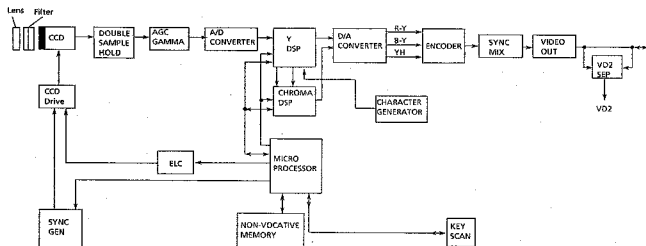


Fig. 1-1 Block Diagram of WV-CL350 Series

The incoming light passes through the lens, the infrared (IR) cut filter, and the crystal filter to reach the surface of the CCD (charge coupled device) image sensor. The CCD image sensor produces the output signal whose level corresponds to incoming light intensity. The output signal is converted into video signal by sample hold circuit. This signal is sent to A/D converter through auto gain control circuit and gamma correction circuit.

The signal is converted into 8 bit digital data by A/D converter and sent to Y digital signal processor (Y DSP).

The signal is routed in two different ways through the Y DSP and the Chroma digital signal processor (CHROMA DSP) respectively.

The 1H delay signal and $(0H + 2H)/2$ delay signals are fed from Y DSP to CHROMA DSP, and from CHROMA DSP, each block data (the image is split into 25 blocks) of the image for each field is supplied sequentially to the microprocessor. When Electric Light Control (ELC) mode is selected, equally add data of 25 blocks with the microprocessor to calculate a difference between the current level and the target brightness level for output of shutter speed and fine adjusting AGC control voltage to the ELC gate array, AGC and Gamma.

The ELC signal generator converts the shutter speed data received from microprocessor into pulses and output to the V. driver. The V. driver converts the shutter pulse into voltage necessary for control of ELC mode and send to CCD.

The output signal of Y DSP flows through the D/A converter which converted into luminance signal to the encoder circuit to be mixed with color signal and sync signal, and output from the camera.

The output signal of CHROMA DSP flows through the D/A converter which converted into R-Y and B-Y signal to the encoder circuit to be mixed with luminance signal, yielding the composite PAL output signal.

The gen-lock control circuit receive external sync signal and generates clock pulse which supplied to sync generator circuit for synchronizing the horizontal (H) and vertical (V) sync signal.

The sync generator generates necessary pulses for producing the composite color video signal, and send them to the Drive pulse generator circuit and Digital Board.

The Drive pulse generator generates H. and V. transfer pulse which are synchronized with the H. and V. drive pulses and sends them to the CCD image sensor.

• Infrared Cut Filter

As shown in Fig. 1-2 the CCD image sensor has sensitivity in infrared region beyond the visible range.

The infrared (IR) cut filter blocks the infrared light rays which the human eye does not see as light.

If the signal is made by using the infrared rays which the human eye can not normally see, picture on the monitor and that seen with the naked eye would differ substantially.

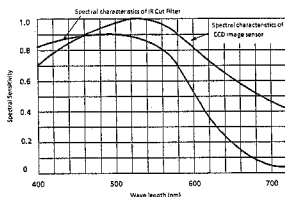


Fig. 1-2 IR Cut Filter Response

• Crystal Filter

The yellow, cyan, green and magenta images are modulated by the fine mosaic filter built into the CCD image sensor, a false signal could develop due to interference between the fine mosaic filters and fine detail objects. The crystal filter is an optical low pass filter which prevents the occurrence of such false signals by blocking the high frequency components of images.

• CCD image Sensor

CCD image sensor is made up of a simple MOS structure and consists of:

- (1) Photo diode (PD) ... Generates charge packets corresponding to the incoming light intensity.
- (2) V-CCD Accumulates the charge packets from PD and transfers them in the vertical direction.
- (3) H-CCD Transfers charge packets in the horizontal direction to the output.
- (4) Output Section Outputs the signal transferred from the H-CCD sequentially.

The block diagram of the CCD image sensor is shown below. Each pixel corresponds to one photo diode.

• Interline Transfer System

Accumulated charge packets on the independent sensor (Photo Diode) are transferred to the vertical shift register (V-CCD) all at once in every vertical blanking period (1/50 sec). They are then shifted one-step down to the horizontal shift register (H-CCD) in every horizontal blanking period. The charge packets in H-CCD are transferred to the left by turns, and taken out as the outputs signal.

Transferring the charge packets down in the V-CCD corresponds to vertical scanning and transferring the signal charges from the V-CCD to the left, in H-CCD corresponds to horizontal scanning.

In the next section, the transfer is described in sequence.

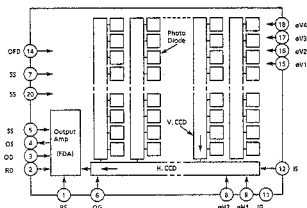


Fig. 1-3 Block Diagram of CCD Image Sensor

Let's study it by referring to the timing of the composite video output (VBS) signal.

- ① At first, all accumulated charge packets in all photo diodes are read out into the V-CCD ((1), (2)).
- ② The charge packets in the V-CCD are transferred one-step down. By this action, the charge packets of one horizontal line are transferred to the H-CCD ((4)).
- ③ The charge packets in the H-CCD are transferred to the left in order and the video signal for that line is output during the horizontal scanning period (horizontal picture period) ((3)).

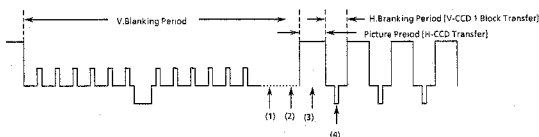


Fig. 1-4 Timing Chart of Transfer

- ④ After completing the transfer from right to left, the next row of charge packets in the V-CCD are transferred into the H-CCD in the next horizontal blanking period.
- ⑤ By repeating ②~④, charge packets for 1V period (312.5 lines) have been transferred (No. 1 field has been completed.).

After that, the steps beginning at ① are repeated for the No. 2 field scanning.

As result, the readout of the charge packets from the PDs is done every 1V period (1/50 sec.). A by-product of this system is a flicker effect when fast moving objects are scanned.

The sensor incorporates an integrated color filter, much the same as a tube-type camera.

The CCD image sensor contains an array of photo-diodes (PD), each under it's own colored filter. As shown below, the photo-diodes are connected to vertical shift registers (V-CCD), which are connected to a horizontal shift register (H-CCD). The output is taken from the Floating Diffusion Amplifier (FDA).

Figure 1-5 indicates the signal charge readout system. This system is called the "field integration" mode, whereby the outputs of a pair of PDs are mixed to produce a single charge packet.

First, each PD charges to a level which is dependent on the level of incident illumination. These charges are then shifted to the V-CCD by vertical transfer pulses 1 and 3 ($\phi V1$ & $\phi V3$). Next, pairs of charges are mixed to produce charge packets. Different pairs of charges are mixed for fields A and B.

- Charge storage in the photo-diodes
- Charge transfer from PDs to V-CCD
- Mixing of charges in V-CCD for field A
- Mixing of charges in V-CCD for field B

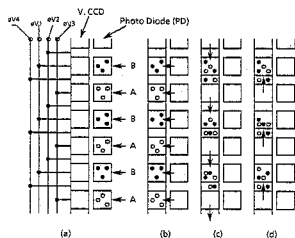


Fig. 1-5 Readout Organization of Signal Charge

Figure 1-6 shows the layout of the color filter. The mixing scheme is shown for both fields as well. For example, to produce line 1 of field A, rows 1 & 2 are mixed. Line 2 is produced by mixing rows 3 & 4, and so on. To produce the first line of field B however, rows 2 & 3 are mixed, followed by 4 & 5 for the next line, and so on.

The output signals from the CCD image sensor are as follows

Complete signal, line N

$$S_N = Y_N + C_N \sin(\omega c.t)$$

Complete signal, line N + 1

$$S_{N+1} = Y_{N+1} + C_{N+1} \sin(\omega c.t)$$

Luminance component, line N

$$Y_N = (Ye + G) + (Cy + Mg) = 2R + 3G + 2B$$

Luminance component, line N + 1

$$Y_{N+1} = (Ye + G) + (Cy + Mg) = 2R + 3G + 2B$$

Chrominance component, line N

$$C_N = (Cy + Mg) - (Ye + G) = 2B - G$$

Chrominance component, line N + 1

$$C_{N+1} = (Cy + Mg) - (Ye + G) = 2R - G$$

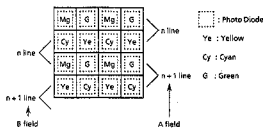


Fig. 1-6 Color Filter Geometry

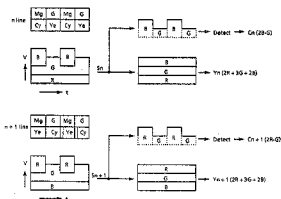


Fig. 1-7 Color Signal Separation (Field "A")

2.Sensor Board

This board receives the pulses from Drive board and sends these pulses to CCD image sensor IC1 in order to take out the CCD output signal.

The CCD output signal obtained at pin 4 of IC1 is fed through buffer Q2 to the board to convert it into the video signal.

• CCD Image Sensor

The CCD image sensor used in camera is interline transfer CCD sensor.

The CCD image sensor has 396,342 picture elements (horizontal 681 × vertical 582).

its image size is 6.55 mm (H) × 4.87 mm (V) so that 1/2-inch optics and lens can be used.

The CCD image sensor is mounted on dual in line package with 20 pins and has a optical window in front of the cell as shown in Fig. 2-1

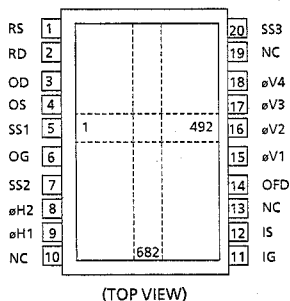


Fig. 2-1 Appearance of CCD Image Sensor

Items	Value	Unit
Cell Size	8.4 (V) × 9.60 (H)	μm
Image Size	4.87 (V) × 6.55 (H)	mm ²
Number of Elements	582 (V) × 681 (H)	PCS

Table 1 Specification of CCD Image Sensor

The pin identification of CCD image sensor is as follows.

Pin No	Name	Description
1	RS	Reset Gate
2	RD	Reset Drain
3	OD	Drain of Output Transistor
4	OS	Source of Output Transistor
5	SS	Ground
6	OG	Output Gate
7	SS2	Ground
8	ØH2	H Transfer Pulse 2
9	ØH1	H Transfer Pulse 1
10	NC	Not Used
11	IG	Input Gate
12	IS	Input Source
13	NC	Not Used
14	OFD	Over Flow Drain
15	ØV1	V Transfer pulse 1
16	ØV2	V Transfer pulse 2
17	ØV3	V Transfer pulse 3
18	ØV4	V Transfer pulse 4
19	NC	Not Used
20	SS3	Ground

3. Drive Board

3-1 Sample Hold Circuit

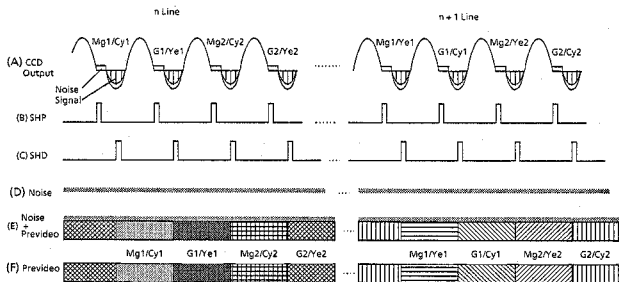


Fig.3-1 Waveform of Sample Hold

This circuit receives the modulated CCD output signal from CCD image sensor on the sensor board and eliminates noise component and produces prevideo signal.

The CCD output signal (A) from Sensor board is supplied to both sample hold circuits inside IC2

The noise component is gated by both SHP (B) and SHD (C) supplied through pins 6 and 7.

The signal + noise component (E) are gated from the CCD output signal (A) by SHD (C) supplied through pin 7.

The gated noise (D) and signal + noise (E) are then supplied to differential amplifier, where noise component is eliminated and signal is inverted. In this way the prevideo signal is obtained at pin 8 of IC2 and supplied to other circuits.

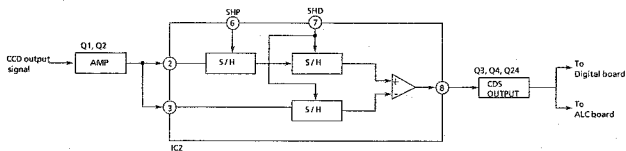


Fig.3-2 Block diagram of YWCXA1439M

3-2 CCD Drive Pulse Generator

This circuit receives vertical drive (VD) pulse and wide horizontal drive (WHD) pulse from Sync/Encoder board and clock pulse from drive pulse generator IC6 and generates CCD drive pulses and other pulses.

The VCO circuit consists of D7, D8, C10, C12, C13, L12 (VCO) with oscillator inside IC6 generates 25 MHz signal.

In IC3 phase of the clock pulse routed to pin 6 with WHD pulse to pin 8 are compared. This compared pulse obtained at pin 11 of IC3 is supplied through L.P.F Q6, R26, R29, C7 and C46 that convert into VCO control bias to VCO circuit forming PLL circuit to stabilize the oscillation frequency.

The pin identification of CCD drive pulse generator IC6 (YWMB62148BU) is as follows.

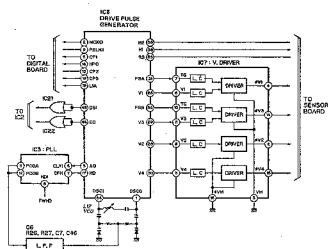


Fig.3-3 Drive Pulse Generator Circuit

Pin No	Pin Name	IN/OUT	Description
1	OSCO	Out	OSC out
2	MCKO	Out	Clock pulse
3	TEST1	In	Not Used
4	FCKEN	In	2fck Output Cont (H : Output L : Stop)
5	FCK2	Out	1f Clock Pulse
6	STM1	In	Shutter Speed Mood 1
7	STM2	In	Not Used
8	STM3	In	Shutter Speed Mood 3
9	PBLK1	Out	Preblanking
10	PBLK2	Out	Not Used
11	CP1	Out	Clamp Pulse 1
12	BI	In	Ground
13	BO	Out	Not Used
14	HPO	Out	ØH Clear Pulse
15	CP2	Out	Clamp Pulse 2

16	CP3	Out	Clamp Pulse 3
17	HO	In	H. Drive Pulse
18	VD	In	V. Drive Pulse
19	LIA	Out	1/2FH
20	LIB	Out	Not Used
21	CI	In	Not Used
22	CO	Out	Not Used
23	V1	Out	V. Transfer Pulse 1 (ØV1)
24	GND	-	Ground
25	VDD	In	+5V DC Power
26	D1	In	Not Used
27	DO	Out	Not Used
28	V2	Out	V. Transfer Pulse 2 (ØV2)
29	V3	Out	V. Transfer Pulse 3 (ØV3)
30	V4	Out	V. Transfer Pulse 4 (ØV4)
31	FSA	Out	Field Shift Pulse (ØV1)
32	FSB	Out	Field Shift Pulse (ØV3)
33	FES	Out	Not Used
34	VDD	In	+5V DC Power
35	H2	Out	H. Transfer Pulse 2 (ØH2)
36	H1	Out	H. Transfer Pulse 1 (ØH1)
37	EXST	In	External Shutter Trigger
38	EXEN	In	External Shutter Mode
39	FRS	Out	Reset Pulse (ØR)
40	GND	-	Ground
41	RW1	In	Reset Pulse Width
42	RW0	Out	Reset Pulse Width
43	EI	In	Not Used
44	EO	Out	Not Used
45	DS1	Out	Sample Hold Pulse 1
46	DS2	Out	Sample Hold Pulse 2
47	INT	-	Ground
48	ADSEN	In	ADS Enable
49	SPO	Out	Not Used
50	SPI	-	Ground
51	TEST2	In	Not Used
52	ASEL1	In	ADS Phase 1
53	ADEL2	In	ADS Phase 2
54	ASD	Out	Not Used
55	TVM	In	NTSC/PAL (H : PAL L : NTSC)
56	VDD	In	+5V DC Power
57	GND	-	Ground
58	DLS1	-	Ground
59	DLS2	In	Not Used
60	INPM	Out	Shutter Mode
61	SP1	Out	Not Used
62	SP2	In	Not Used
63	SDC	In	Serial Data Cont
64	OSC1	In	OSC in

The H. transfer pulse 1, 2 (H1, 2) obtained at pins 36 and 35 of IC6 are supplied to Sensor board.

The reset pulse (R) obtained at pin 39 of IC6 is supplied to Sensor board.

The V. transfer timing pulses 1 (V1), 2 (V2), 3 (V3) and 4 (V4) are generated in IC6 and obtained at pins 23, 28, 29 and 30 of IC6.

These pulses are supplied to V.Driver IC7 where their levels are converted to specified DC level according to the fixed timing for producing V. Transfer pulses (ØV1 - ØV4).

The field shift pulses from pins 31 and 32 of IC6 are supplied to pins 7 and 10 of IC7 and mixed with V1 and V3 pulses.

3-3 ALC Circuit

When the Lens Selection switch SW1 on the ALC board is set to DC position, lens iris control DC bias is sent to ALC Lens through ALC board.

The damper signal induced by damper coil in auto iris lens is fed back through IC10 (a) to IC10 (b) for preventing hunting.

When the Lens Selection Switch SW1 on the ALC board is set to VIDEO position, CDS output signal from CDS output circuit Q3, Q4 and Q24 on the Drive board is sent to lens through ALC board.

3-4 Reset/Power off Control Circuit

This circuit generates the reset control signal and power off control DC signal.

+4.5V DC obtained at pin 1 of IC8 after 2μ sec when power on the camera is fed to pin 16 of Microprocessor IC10 and pin 41 of ELC signal generator IC13 on the Digital board.

When power off the camera, power off control obtained at pin 1 of IC9 is fed to pin 23 of Microprocessor IC10 on the Digital board.

3-5. VD2 Separation Circuit

When the multiplexed vertical drive pulse (VD2) is supplied to the Video Output Connector on the rear of camera from the Multiplex Unit WJ-MP404, signal is appear at pin 13 of CN6.

The VD2 is supplied to VD2 separator consisting of Q18 ~ Q21 where only VD2 is extracted.

The only VD2 obtained at collector of Q18 is fed to pin 63 of Sync generator IC7 on the Sync/Encoder board.

4. Sync/Encoder Board

4-1 Sync Generator Circuit

This circuit generates the pulses necessary to produce the video signal.

The sync generator IC7 has detect circuits of Sync signal (Multiplexed Vertical Drive (VD2), Line-lock (L.L), Color Composite Video or Black burst signal (VBS), B/W Composite Video or Composite Sync Signal (VS) and internal Sync (INT) and output of phase comparator inside IC7 is selected by analog switch inside IC7 that apply to input signal.

The priority of sync mode is as follows.

	Sync mode
1	VD2
2	L.L
3	VBS
4	VS
5	INT

The 17 MHz oscillator is composed of X1, D2, D3, R9-R12, C4 and C5, its oscillation frequency controlled by oscillator control DC obtained at pin 1 of IC7 is fed to 17 MHz oscillator.

The oscillation output is supplied to pin 72 of IC7 for producing 4.43 MHz subcarrier signal.

The subcarrier signals (SC B) and (SC R) obtained at pins 74 and 75 of IC7 are fed to pin 39 (SC B) and pin 40 (SC R) of Modulator/Encoder IC4.

The sync mode obtained at pin 38, pin 39 and pin 40 of IC7 is fed to Key Scan circuit of Digital board.

	Pin 38	Pin 39	Pin 40
Sync mode	M1	M2	M3
VD2	H	H	L
LL	H	L	H
VBS	H	L	L
VS	L	H	H
INT	L	L	L

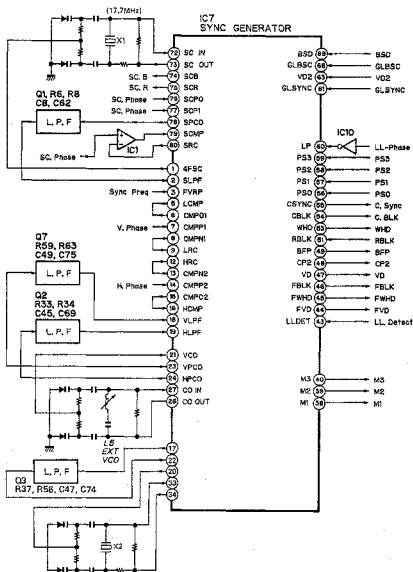


Fig.4-1 Sync Generator Circuit

The pin identification of sync generator IC7 (MN73069LBM2) is as follows.

Pin No	Pin Name	IN/Out	Description
1	4FSC	Out	OSC Cont DC
2	SLPF	In	Phase detect
3	FVRP	In	Frequency cont
4	FVR	-	Not used
5	LCMP	In	Clear
6	CMPO1	Out	V. Phase
7	CMPP1	In	V. Phase
8	CMPN1	In	V. Phase cont
9	LRC	Out	V. Phase cont
10	VDD2	In	DC Power
11	GND2	-	Ground
12	HRC	Out	H. Phase cont
13	CMPP2	In	H. Phase cont
14	CMPP2	In	H. Phase
15	CMPO2	Out	H. Phase
16	HCMP	In	Clear
17	DLPF	In	V.Lock
18	VLPF	In	V. LOCK
19	HLPF	In	H. LOCK
20	VCKO	Out	OSC Cont
21	VCO	Out	LC OSC Cont
22	DPCO	Out	Not Used
23	VPCO	Out	V. Phase Comparator output
24	HPCO	Out	H. Phase Comparator output
25	MVPC	In	V. Reset Mask pulse ON/OFF (H : ON L : OFF)
26	VC1	Out	VCO Cont
27	COIN	In	External VCO
28	COOUT	Out	External VCO
29	CKO	Out	Clock Pulse
30	GND3	-	Ground
31	VDD3	In	DC Power
32	VC2	Out	Not Used
33	CXIN	In	External VCO
34	CXOUT	Out	External VCO
35	TESTA	In	Not Used
36	TESTB	In	Not Used
37	TESTC	In	Not Used
38	M1	Out	Gen-Lock Mode Detect-1
39	M2	Out	Gen-Lock Mode Detect-2
40	M3	Out	Gen-Lock Mode Detect-3
41	CW	In	Color/B/W Select (H : B/W, L : Color)
42	VDCF	In	Field/Frame Select (H : Field L : Frame)
43	LLDET	In	LI Select (H : ON L : OFF)
44	FVD	Out	Vertical Drive Pulse
45	FWHD	Out	Wide Horizontal Drive Pulse
46	FBLK	Out	Blanking Pulse
47	VD	Out	Vertical Drive Pulse
48	CP2	Out	Clamp Pulse-2
49	BFP	Out	Burst Flag Pulse
50	GND4	-	Ground
51	RBLK	In	Return Blanking Pulse
52	PWHD	In	Wide Horizontal Drive Pulse
53	WHD	Out	Wide Horizontal Drive Pulse
54	CBLK	Out	Composite Blanking Pulse
55	CSYNC	Out	Composite Sync
56	PSO	In	Line-Lock coarse ADJ
57	PSI	In	Line-Lock coarse ADJ
58	PS2	In	Line-Lock coarse ADJ
59	PS3	In	Line-Lock coarse ADJ
60	LP	In	Line-Lock Pulse
61	GLSYNC	In	Gen-Lock Sync
62	GLVD	In	Gen-Lock VD
63	VD2	In	Gen-Lock VD
64	NP	In	NTSC/PAL Select (H : PAL L : NTSC)
65	MCONT	In	Gen-Lock Mode Detect Cont
66	MS	In	OSC Frequency Select (H : NTSC 910fh PAL 908fh) (L : NTSC 1820fh PAL 1816fh)
67	CLR	In	Clear
68	GLBSC	In	Gen-Lock Burst Subcarrier
69	BSD	In	Burst Subcarrier Detect
70	VDD1	In	DC Power
71	GND1	-	Ground
72	SCIN	In	4fsc (NTSC : 14.3 MHz PAL : 17.7 MHz)
73	SCOUT	Out	4fsc (NTSC : 14.3 MHz PAL : 17.7 MHz)
74	SCR	Out	Subcarrier R
75	SCB	Out	Subcarrier B
76	SCPO	In	Burst lock Phase coarse ADJ
77	SCP1	In	Burst lock Phase coarse ADJ
78	SCPO	Out	SC Phase
79	SCMP	In	SC Phase clear
80	SRC	Out	SC Phase cont

4-2 Encoder Circuit

This circuit generates the chrominance signal from the R-Y and B-Y color difference signals.

The R-Y signal converted into an analog signal by D/A converter IC12 on the Digital board is fed to modulator circuit in IC4.

The R-Y signal is balance modulated at modulator circuit in IC4 by Subcarrier signal for reproducing the R signal. Similarly, the B-Y signal converted into an analog signal by D/A converter IC12 on the Digital board obtained at pin 20 of IC4 is fed to modulator circuit in IC4.

The B-Y signal is balance modulated at modulator circuit in IC4 by Subcarrier signal for reproducing the B signal.

The R and B signals are mixed to generate chrominance (C) signal, and C signal obtained at pin 47 of IC4 is fed to 4.43MHz band pass filter (B.F.P) CF6, where the chrominance component is only passed through.

The C signal is mixed with luminance signal (Y) in IC4.

The mixed C and Y signal obtained at pin 28 of IC4 is fed to sync mix Q28 and Q45.

The mixed C and Y signal is mixed with sync signal by Q28 and Q45 to produce a composite video signal.

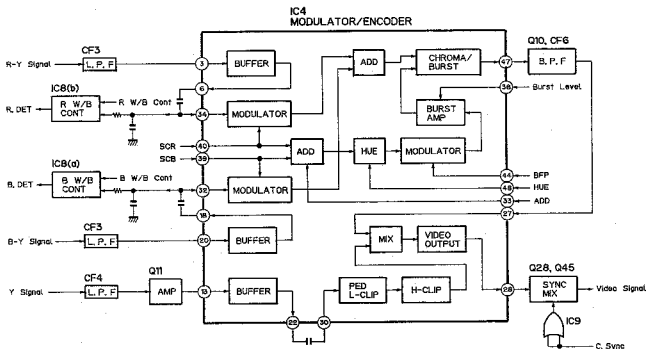


Fig. 4-2 Encoder circuit

4-3 D/A Converter Circuit

This D/A Converter IC5 receives the 12 bit serial data from Digital board and analogue signal obtained at pin 4 ~ pin 9, pin 12, pin 13, pin 18 and pin 19 of IC5 is fed to other circuits. The pin identification of D/A converter IC5 (YWM62352FP) is as follows:

Pin No	Pin Name	IN/Out	Description
1	VSS	-	Ground
2	A03	Out	Carrier Add
3	A04	Out	SC ADJ
4	A05	Out	R white balance control
5	A06	Out	R white balance control
6	A07	Out	Low clip
7	A08	Out	SC Phase
8	A09	Out	H Phase
9	A10	Out	V Phase
10	VDD	In	+ 5V DC
11	VCC	In	+ 5V DC
12	A12	Out	Chroma phase
13	A11	-	Not Used
14	D0	-	Not Used
15	LD	In	D/A CS
16	CLK	In	Serial clock
17	DI	In	Serial data
18	A01	Out	Burst level
19	A02	Out	+ 5V Cont
20	GND	-	Ground

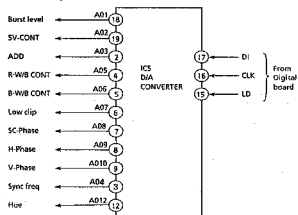


Fig. 4-3 D/A Converter circuit

4-4 External Sync Signal Circuit

When external sync signal such as VBS or VS signal is supplied to Gen-lock Input Connector on the rear of camera, signal obtained at pin 7 of CN3 is fed to inverter/amplifier Q37, and it is sent to inverter Q38 and Band Pass Filter (B.F.P) CF1.

The gen-lock sync signal obtained at pin 6 (collector) of Q38 whose chrominance component is eliminated by R55 and C16 is fed to pin 61 of sync generator IC8.

The gen-lock burst signal obtained at B.F.P CF1 is fed to burst detect Q18 and Q39 through amplifier Q12 and Q13 and burst output Q41 through amplifier Q40 and B.F.P CF2.

The gen-lock burst detect pulse obtained at collector of Q18 is fed to pin 69 of IC8.

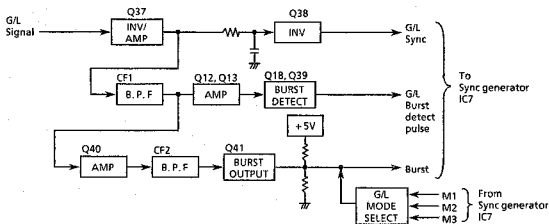


Fig. 4-4 External Sync Signal circuit

5. Digital Board

5-1 AGC/Gamma Correction Circuit

The CDS Output signal from Drive board is fed through Low Pass Filter (L.P.F) CF5 and amplifier Q26 to clamp circuit in IC1.

The clamped CDS output signal is supplied to gain control circuit through low clip circuit in IC1.

The gain control DC bias from microprocessor IC10 on the Digital board is fed to gain control circuit in IC1 through pin 13, it is then fed to gamma control and gamma correction circuit in IC1.

In gamma correction circuit, this signal is corrected to the non-linear photoelectric conversion characteristic of cathode ray tube (CRT) and this circuit reproduces a linear of high fidelity on the monitor.

The gamma corrected video signal obtained at pin 11 of IC1 is supplied to Y. Digital Signal Processor (Y. DSP) IC8 through A/D Converter IC6.

5-2 Y Digital Signal Processor (Y. DSP) Circuit

This circuit receives the 8 bit digital data of prevideo signal converted by A/D converter IC6 from AGC/gamma correction IC1 and removes chrominance component from prevideo signal and luminance (YH) signal is detected.

The YH signal data obtained at pin 23 ~ pin 30 of IC8 is supplied through knee circuit, highlight aperture, 2H Enhancer (V-Edge) and Aperture correction (H-Edge) in IC8 to D/A converter IC12.

The detected chrominance signal data is supplied to C DSP IC9, the delayed 1H signal data is delayed and $(0H + 2H)/2$ delayed signal data is made.

The 1H delayed signal data obtained at pin 10 ~ 17 of IC8 and $(0H + 2H)/2$ delayed signal data obtained at pin 1 ~ 9 of IC8 are fed to chroma digital signal processor circuit in IC9.

The chroma gain control data obtained at pin 63 ~ 68 of IC8 is fed to C DSP IC9 to suppress a chrominance signal in case of low light condition or clip a chrominance signal in case of high light condition.

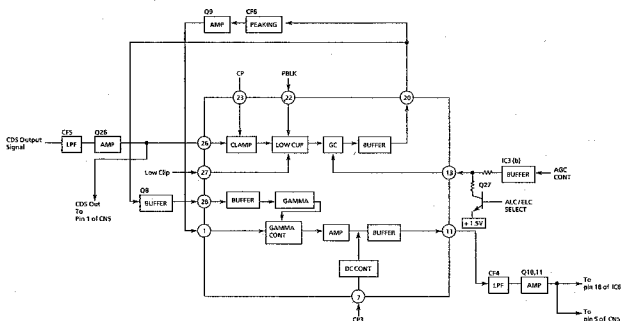


Fig. 5-1 AGC/Gamma Correction circuit

The pin identification of Y.DSP IC8 (MN6730FHP) is as follows.

Pin No	Pin Name	IN/Out	Description			
1	DL28	Out	(0H + 2H)/2 delayed signal data	41	NP8	- Not Used
2	DL27	Out	(0H + 2H)/2 delayed signal data	42	ADR4	In Address 4
3	DL26	Out	(0H + 2H)/2 delayed signal data	43	ADR4	In Address 3
4	DL25	Out	(0H + 2H)/2 delayed signal data	44	ADR4	In Address 2
5	DL24	Out	(0H + 2H)/2 delayed signal data	45	ADR4	In Address 1
6	DL23	Out	(0H + 2H)/2 delayed signal data	46	ADR4	In Address 0
7	DL22	Out	(0H + 2H)/2 delayed signal data	47	DB7	In Data 7
8	DL21	Out	(0H + 2H)/2 delayed signal data	48	DB6	In Data 6
9	DL20	Out	(0H + 2H)/2 delayed signal data	49	DB5	In Data 5
10	DL17	Out	1H delayed signal data	50	DB4	In Data 4
11	DL16	Out	1H delayed signal data	51	DB3	In Data 3
12	DL15	Out	1H delayed signal data	52	DB2	In Data 2
13	DL14	Out	1H delayed signal data	53	DB1	In Data 1
14	DL13	Out	1H delayed signal data	54	DB0	In Data 0
15	DL12	Out	1H delayed signal data	55	CS3	In Chip Select 3
16	DL11	Out	1H delayed signal data	56	CS2	In Chip Select 2
17	DL10	Out	1H delayed signal data	57	CS1	In Chip Select 1
18	TEST2	-	Ground	58	NWE	In Write Enable
19	TEST1	-	Ground	59	BLK	In Wide Horizontal Drive pulse
20	CLK	In	clock pulse	60	NC	- Not Used
21	VSS1	-	Ground	61	BLK2	- Not Used
22	VDD1	In	+4.5V DC	62	BLKA	- Not Used
23	Y08	Out	Y data	63	CGD 5	Out Chroma gain control
24	Y07	Out	Y data	64	CGD 4	Out Chroma gain control
25	Y06	Out	Y data	65	CGD3	Out Chroma gain control
26	Y05	Out	Y data	66	CGD2	Out Chroma gain control
27	Y04	Out	Y data	67	CGD1	Out Chroma gain control
28	Y03	Out	Y data	68	CGD0	Out Chroma gain control
29	Y02	Out	Y data	69	VDD2	In +4.5V DC
30	Y01	Out	Y data	70	VSS2	- Ground
31	Y00	-	NOT USED	71	DLS	- Not Used
32	HCLR	In	H Clear Pulse	72	DIN7	In Data 7
33	HD	In	Wide Horizontal Drive pulse	73	DIN6	In Data 6
34	VCTL	-	Not Used	74	DIN5	In Data 5
35	BIN	-	Not Used	75	DIN4	In Data 4
36	GIN	-	Not Used	76	DIN3	In Data 3
37	RIN	-	Not Used	77	DIN2	In Data 2
38	BCTL	In	Back Character	77	DIN1	In Data 1
39	FMEM	In	Character	79	DIN0	In Data 0
40	NC	-	Not Used	80	NC	- Not Used

5-3 Chroma Digital Signal Processor (CDSP) Circuit

The circuit generates the R-Y and B-Y color difference signals data.

The R-Y and B-Y color difference signal data obtained at pin 73 ~ 80 of C.DSP IC9 is fed through DIA converter when the R-Y and B-Y color difference signal data is converted into analog signals to Chroma Encoding circuit of Sync/Encoder board.

The pin identification of C.DSP IC9 (MN6731FHP) is as follows.

Pin No	Pin Name	IN/Out	Description			
1	CLK	in	Clock pulse	41	DSEL1	- Ground
2	TEST1	-	Ground	42	NWE	In Write enable
3	TEST2	-	Ground	43	NRE	In Read enable
4	DL10	In	1H delayed signal data	44	CS1	in Chip Select 1
5	DL11	In	1H delayed signal data	45	CS2	in Chip Select 2
6	DL12	In	1H delayed signal data	46	CS3	In Chip Select 3
7	DL13	In	1H delayed signal data	47	DB0	In/Out Data 0
8	DL14	In	1H delayed signal data	48	DB1	In/Out Data 1
9	DL15	In	1H delayed signal data	49	DB2	In/Out Data 2
10	DL16	In	1H delayed signal data	50	DB3	In/Out Data 3
11	DL17	In	1H delayed signal data	51	DB4	In/Out Data 4
12	DL20	In	(0H + 2H)/2 delayed signal data	52	DB5	In/Out Data 5
13	DL21	In	(0H + 2H)/2 delayed signal data	53	DB6	In/Out Data 6
14	DL22	In	(0H + 2H)/2 delayed signal data	54	DB7	In/Out Data 7
15	DL23	In	(0H + 2H)/2 delayed signal data	55	ADR0	In Address 0
16	DL24	In	(0H + 2H)/2 delayed signal data	56	ADR1	In Address 1
17	DL25	In	(0H + 2H)/2 delayed signal data	57	ADR2	In Address 2
18	DL26	In	(0H + 2H)/2 delayed signal data	58	ADR3	In Address 3
19	DL27	In	(0H + 2H)/2 delayed signal data	59	ADR4	In Address 4
20	DL28	In	(0H + 2H)/2 delayed signal data	60	ADR5	In Address 5
21	VD	in	Vertical Drive pulse	61	DCP	In Digital clamp pulse
22	HD	In	Wide Horizontal Drive pulse	62	BIN	- Ground
23	CSPC	In	Line Select	63	GIN	- Ground
24	BEND	Out	Boarder End	64	RIN	- Ground
25	BF	In	Blanking pulse	65	BCTL	In Not Used
26	BFA	In	Return Blanking pulse	66	FMEM	In Not Used
27	SYNC	-	Ground	67	NPB	In Negative/Positive select
28	SYNCA	-	Not Used	68	BLK	In Wide Horizontal Drive pulse
29	VDD1	In	+ 4.5V DC	69	PWM	- Not Used
30	VSS1	-	Ground	70	VSS2	- Ground
31	CP2	-	Ground	71	VDD2	In + 4.5V DC
32	CP2A	-	Not Used	72	FLD	Out Field Select
33	CGD0	In	Chroma gain control data 0	73	CO1	Out Color difference signal data 1
34	CGD1	In	Chroma gain control data 1	74	CO2	Out Color difference signal data 2
35	CGD2	In	Chroma gain control data 2	75	CO3	Out Color difference signal data 3
36	CGD3	In	Chroma gain control data 3	76	CO4	Out Color difference signal data 4
37	CGD4	In	Chroma gain control data 4	77	CO5	Out Color difference signal data 5
38	CGD5	In	Chroma gain control data 5	78	CO6	Out Color difference signal data 6
39	HCLR	In	H Clear pulse	79	CO7	Out Color difference signal data 7
40	HCLK	Out	R-Y/B-Y Select	80	CO8	Out Color difference signal data 8

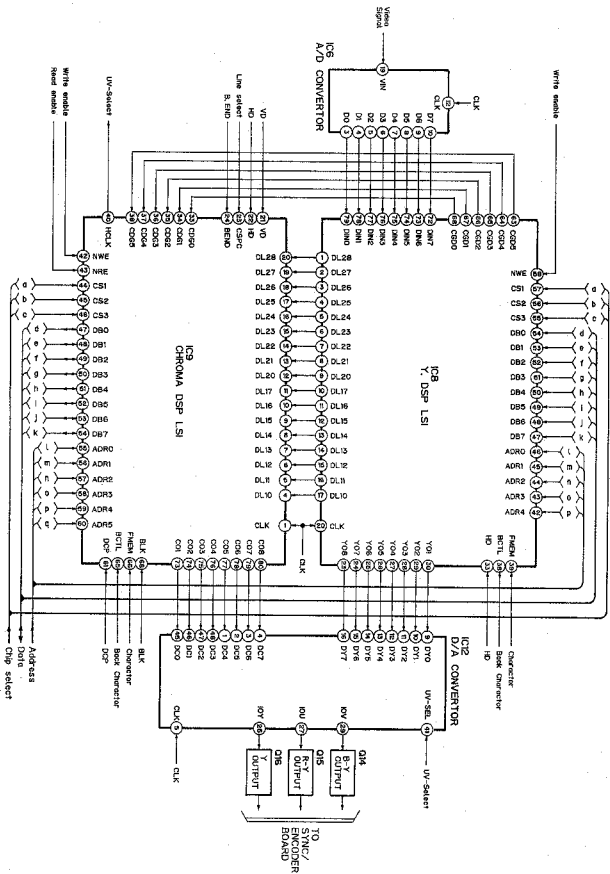


Fig. 5-2 Y DSP / C DSP circuit

5-4 Microprocessor Circuit

This circuit generates the control (command) data and sent to Y.DSP, C.DSP and ELC signal generator.

The pin identification of microprocessor IC10 (MN188166CCV2) is as follows.

Pin No	Pin Name	IN/Out	Description				
1	ADR13	Out	Chip Select	41	P32	Out	Chip Select
2	ADR12	-	Not Used	42	P31	Out	D/A Chip Select
3	ADR11	-	Not Used	43	P30	Out	Chip Select
4	ADR10	-	Not Used	44	SBT0	In/Out	Serial Clock
5	ADR9	-	Not Used	45	SB10	In	Serial Data
6	ADR8	-	Not Used	46	SB00	Out	Serial Data
7	ADR7	Out	Address 7	47	NC	-	Not Used
8	ADR6	Out	Address 6	48	SBT1	In/Out	Serial Clock
9	ADR5	Out	Address 5	49	SB11	In	Serial Data
10	ADR4	Out	Address 4	50	SB01	Out	Serial Data
11	ADR3	Out	Address 3	51	P94	In	Test
12	ADR2	Out	Address 2	52	P93	In	Busy
13	ADR1	Out	Address 1	53	P92	Out	ALC Speed
14	ADR0	Out	Address 0	54	P91	Out	Reset
15	EX1	-	Ground	55	P90	In	R detect signal data
16	RST	In	Reset	56	AVSS	-	Ground
17	RE	Out	Read enable	57	SH	-	Not Used
18	WE	Out	Write enable	58	VREF-	-	Ground
19	R/W	-	Not Used	59	DA3	Out	AGC Cont
20	S3	-	Not Used	60	DA2	Out	ALC FINE CONT
21	S2	-	Not Used	61	DA1	Out	ALC CONT
22	S1	-	Not Used	62	DA0	Out	OB cont
23	IRQ2	In	Power off	63	AD3	-	Not Used
24	IRQ1	In	Boarder End	64	AD2	-	Not Used
25	IRQ0	In	Vertical Drive pulse	65	AD1	-	Not Used
26	P22	In	B detect signal data	66	AD0	-	Not Used
27	P21	In	Field Select	67	VREF +	In	+ 3.5V DC
28	P22	In	Key scan	68	VDD	In	+ 4.5V DC
29	OSC2	Out	8 MHz OSC	69	VDD	In	+ 4.5V DC
30	OSC1	In	8 MHz OSC	70	DATA7	In/Out	Serial data 7
31	VSS	-	Ground	71	DATA6	In/Out	Serial data 6
32	X1	-	Ground	72	DATA5	In/Out	Serial data 5
33	P17	Out	ALC/ELC Select (ELC : H ALC : L)	73	DATA4	In/Out	Serial data 4
34	P16	Out	LL Detect (LL : H)	74	DATA3	In/Out	Serial data 3
35	P15	Out	SC Phase coarse	75	DATA2	In/Out	Serial data 2
36	P14	Out	SC Phase coarse	76	DATA1	In/Out	Serial data 1
37	P13	Out	V.Phase coarse	77	DATA0	In/Out	Serial data 0
38	P12	Out	V.Phase coarse	78	VSS	-	Ground
39	P11	Out	V.Phase coarse	79	ADR15	Out	Chip Select
40	P10	Out	V.Phase coarse	80	ADR14	Out	Chip Select

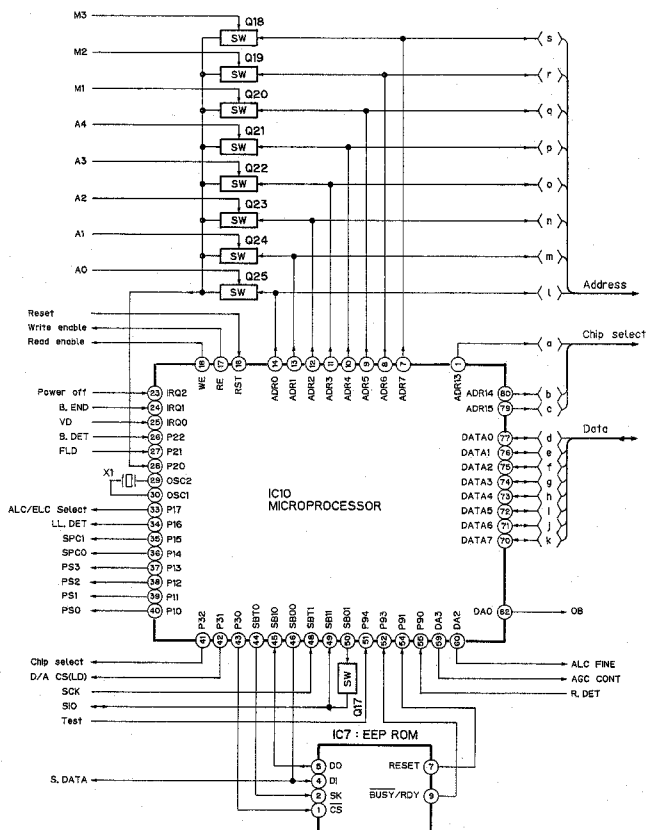


Fig. 5-3 Microprocessor circuit

5-5 ELC/Character Generator Circuit

This circuit generates the electric light control signal and character signals and sends them out to the microprocessor IC10.

When ELC mode is selected, the each block data (the image is split into 25 blocks) of the image for each field is supplied sequentially to the microprocessor.

In the microprocessor, the block datas are averaged and compared with the target adjustment level. The result of comparison is fed to pins 26 ~33 of ELC signal generator IC13 to generates Shutter speed control and AG voltage.

The ELC pulse obtained at pin 35 of IC13 is fed to Drive board.

The pin identification of ELC signal generator IC13 (MN53020LB01) is as follows.

Pin No Pin Name IN/OUT Description

1	CLK	In	Clock pulse
2	INV2	In	LL Select
3	XCH	In	Field read out pulse
4	INV1	In	LL Select
5	DCSPC	Out	Line Select
6	CSPC	In	1/2FH
7	XVDA	Out	Vertical Drive pulse
8	XHDA	Out	Clamp pulse 2
9	HDA	In	Clamp pulse 2
10	VDA	In	Vertical Drive pulse
11	XWE	In	Write enable
12	TEST	-	Ground
13	WDOUT	Out	Black character
14	DOUT	Out	Character

15	WCHRIN	In	Back character
16	CHRIN	In	Character
17	VDD	In	+4.5V DC
18	VSS	-	Ground
19	ADDR0	In	Address 0
20	ADDR1	In	Address 1
21	ADDR2	In	Address 2
22	ADDR3	In	Address 3
23	XCS1	In	Chip select 1
24	CS2	In	Chip select 2
25	CS3	In	Chip select 3
26	D0	In	Data 0
27	D1	In	Data 1
28	D2	In	Data 2
29	D3	In	Data 3
30	D4	In	Data 4
31	D5	In	Data 5
32	D6	In	Data 6
33	D7	In	Data 7
34	XSUB	-	Not Used
35	XXSUB	Out	ELC pulse
36	HD	In	Wide horizontal drive pulse
37	VD	In	Vertical drive pulse
38	INV01	Out	LL select
39	VSS	-	Ground
40	VDD	In	+4.5V DC
41	XCLR	In	Reset
42	INV03	Out	NTSC/PAL select (NTSC : H PAL : L)
43	INV3	In	NTSC/PAL select (NTSC : H PAL : L)
44	INV02	Out	LL select

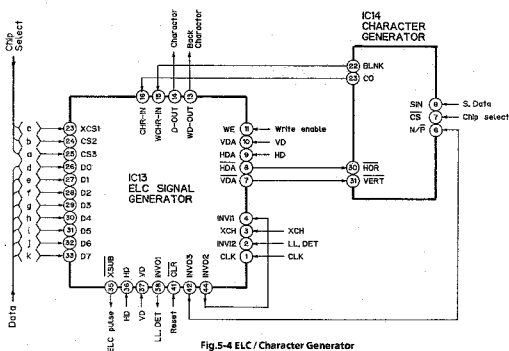


Fig.5-4 ELC / Character Generator

When the image of ⑤ in the signal is shown on the screen.

- Data of ⑤ has been stored in DSP when data of ⑥ is fed to DSP.
- Microprocessor at that time calculates the level difference against target level based on data of ⑤.
- The ELC at that time outputs shutter pulse to the image of ⑥ by the shutter data supplied from Microprocessor to control the shutter speed by the shutter data.
- AGC IC outputs gain control voltage to the image of ⑥ to control its gain by the block data of ⑤ supplied from Microprocessor.

As a result, the shutter data calculated by Microprocessor is reflected to image of ⑥ (3V later), and the AGC control voltage is reflected to image of ⑥ (2V later).

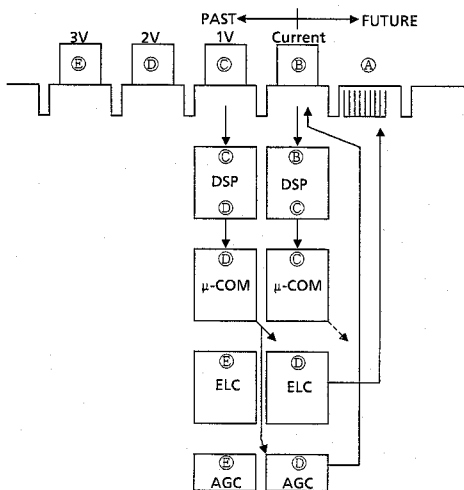


Fig. 5-5 Signal Processing with Microprocessor

About Your Computer

In order to run the E.V.R (Electric Variable Resistor) adjustment program your IBM-PC (PS2 type) or compatible must meet the following requirements :

- The DOS Operating System must be 3.3 or higher.
- The Operating System must be 100% compatible with your computer.
- The memory in your IBM-PC must be at least 640K-bytes, and 512K-bytes shall be available to the E.V.R adjustment program.

Installing E.V.R Adjustment Program

- The Example given here is for A 2 drive computer, your procedure might vary slightly depending on drive configuration.
- Formatting new disk and making a copy of DOS Operating System
 - a) Insert disk containing DOS operating system into your floppy drive (for example, drive A) and type **A :**
 - b) Insert new disk into your floppy drive (for example, drive B).
 - c) Format and make a copy of DOS operating system from your original disk to new disk by typing **FORMAT B : / S** and press **ENTER**.
 - d) Type **COPY ANSI.SYS B :** and press **ENTER**.
- Install E.V.R Adjustment Program onto formatted new disk with DOS operating system.
 - e) Take out original disk containing DOS operating system from your floppy drive (drive A) and insert disk containing E.V.R adjustment program into your floppy drive (drive A) and type **A :**
 - f) At the prompt, type **CD IBMPC** and press **ENTER**.
 - g) If required, type **COPY CONFIG.SYS B :** and press **ENTER**.
 - h) Type **CD NTSC**.
 - i) Type **COPY ADJS.EXE B :** and press **ENTER**.
 - j) Type **CD SEQ** and press **ENTER**.
 - k) Type **COPY CL350E.SEQ B :** and press **ENTER**.
 - l) Type **CD** and press **ENTER**.
 - m) Type **CD EVR** and press **ENTER**.
 - n) Type **COPY *.EVR B :** and press **ENTER**.
 - o) After completing installation of program, you are ready to use E.V.R adjustment program.

Note :

When completed the new disk should be a bootable disk which contains the following files :

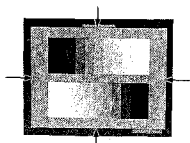
- | | | |
|----|---------|-----|
| 1. | COMMAND | CON |
| 2. | ANSI | SYS |
| 3. | CONFIG | SYS |
| 4. | ADJS | EXE |
| 5. | CL350E | SEQ |
| 6. | CL350E | EVR |
| | CL352E | EVR |
| | CL354E | EVR |

ADJUSTMENT PROCEDURE

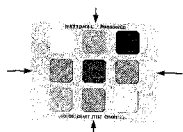
1. Test Equipment Required

The following test equipments are required for adjustment.

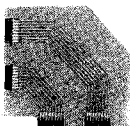
- Oscilloscope (50 MHz band width, dual trace, delayed with three probes)
- Vector scope
- Frequency counter
- Waveform monitor
- Under scanned color video monitor
- Lens : Automatic iris control lens such as WV-LA12 and manual iris lens
- Lighting (140 footcandles (1400 lux) 3200°K)
- Lux meter
- Signal generator (Black burst or Composite video signal)
- Color temperature conversion filter (C12, C4)
- Personal computer (IBM-PS2 or AT type)
- Standard straight RS-232C cable
- Logarithmic gray scale chart (Part No. : YWV2310RB99)



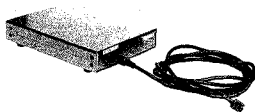
- Color chart (Part No. : YWV2310RB98)



- Extension board (Part No. : YWVK2CL32P1A)



- E.V.R Adjustment kit (Parts No. : YWV0EA0182AN)



2. Disassembling Procedure for Adjustment

- Remove two screws fixing camera mounting and remove camera mounting. (Fig. 2-1)

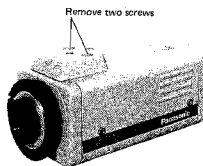


Fig. 2-1

- Remove six screws fixing upper cover and remove upper cover by pulling it upward. (Fig. 2-2)

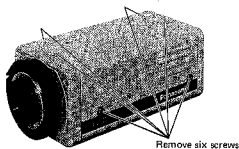


Fig. 2-2

- Remove two screws fixing bottom cover and remove bottom cover by pulling it down ward. (Fig. 2-3)

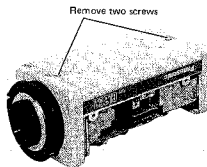


Fig. 2-3

- Remove four screws fixing digital board.

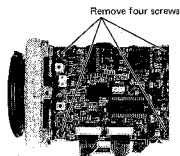


Fig. 2-4

- Fix two screws removing digital board as shown in Fig2-5.
- When adjusting the camera use extension board.
(Part No. : YWVKZCL32P1A)

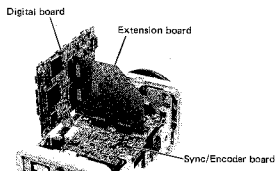


Fig. 2-5

3. CCD Image Sensor Replacement

- Remove upper and bottom covers while referring to the "2. Disassembling procedure for Adjustment" on page 22.
- Remove four screws fixing front chassis assembly. (Fig. 3-1)

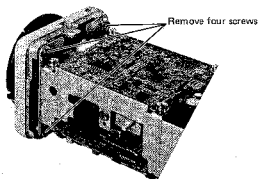


Fig. 3-1

- Disconnect CN1 from Drive board and remove two springs. (Fig. 3-2)

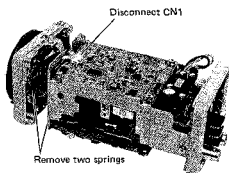


Fig. 3-2

- Remove one screws fixing earth lag and remove CCD image sensor assembly.

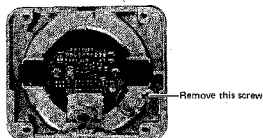


Fig. 3-3

4. Connection and Setting up for Adjustment

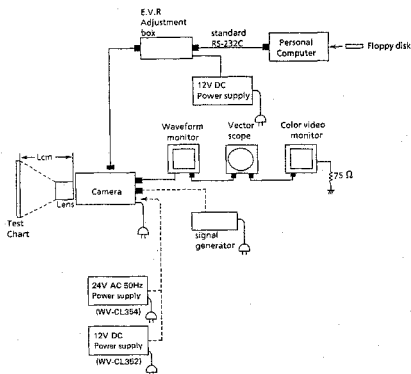


Fig. 4-1

Connection

- Connect the VIDEO OUTPUT connector on the rear of camera to color video monitor through waveform monitor and vectorscope using coaxial cable.
- Terminate color video monitor with 75 ohms.

Set up

- Set Lens Selection Switch on the side of camera to DC position
- Set Gen-lock Termination Switch on the rear of camera to OFF position.

5. Adjustment Procedure

- Refer to page 43 for the Location of test points and adjusting control.

■ Adjustment Procedure-1

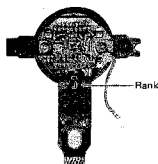
(1)-1 V.Sub Adjustment

Test Point : Pin 14 (OFD) of IC1 Sensor board
Adjust : VR2 (V. SUB) Sensor board

- Check rank letter on CCD sensor assy.
- Connect digital volt meter to Pin 14 (OFD) of IC1 on Sensor board.
- Adjust VR2 (V. SUB) so that voltage becomes as shown in Table 1.

Rank	A	B	C	D	E	F	G	H	J	K
Voltage	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
Rank	L	M	N	P	Q	R	S	T	U	-
Voltage	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	-

Table-1



(1)-2 VCO Adjustment (confirmation)

Test Point : TP1 (VCO) Drive board
Adjust : VL12 (VCO) Drive board

- Connect digital voltmeter to TP1 (VCO) on the drive board.
- Confirm that voltage at TP1 is $2.3 \pm 0.1V$.
- If not, VL12 (VCO) so that voltage becomes $2.3V \pm 0.1V$.

(1)-3 External VCO Adjustment (confirmation)

Test Point : TP3 (EXT VCO) Sync board
Adjust : LS (EXT VCO) Sync board

- Supply the black burst signal or composite video signal to GEN-LOCK INPUT connector on the rear of camera.
- Set the Gen-lock termination switch on the rear of camera to ON position.
- Connect the digital voltmeter to TP3 (EXT VCO) on the sync board.
- Confirm that voltage at TP3 is $2.3 \pm 0.1V$.
- If not, adjust LS (EXT VCO) so that voltage becomes $2.3V \pm 0.1V$.
- Disconnect the black burst signal or composite video signal from GEN-LOCK INPUT connector.

(1)-4 +9V Adjustment (WV-CL352 only)

Test Point : TP1 (+9V) Power board
Adjust : VR1 (+9V) Power board

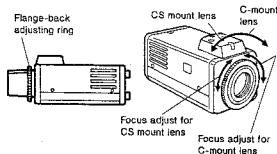
- Connect digital voltmeter to TP1 (+9V) on the Power board.
- Adjust VR1 (+9V) so that voltage becomes $+9V \pm 0.01V$.

(1)-5 Flange-back adjustment

Test Point : Flange-back adjusting ring

Adjust : Color video monitor

- Aim the camera at dark object further than 10m.
- Set the lens focus to infinity (∞) position.
- Loosen the flange-back adjusting ring fixing screw and adjust the ring for best focus.
- Set between camera and object to 0.6m.
- Confirm that picture is in-focus. If not, re-adjust flangeback adjusting ring for best focus.
- Repeat above procedure until the focus tracks throughout the lens focus.
- Tighten the fixing screw.



- After finishing, the message **ERROR 14 SCK NG!** will be displayed, but this is normal.
- Press ENTER for starting adjustment, following adjusting screen will be displayed.

NOTE:

- EEPROM mentioned in this adjustment procedure is IC7 on digital board.
- RAM mentioned in this adjustment procedure is IC10 on digital board.

■ Adjustment Procedure-2 (E.V.R Adjustment)

- Connect E.V.R Adjustment box to CN6 on the digital board using extension cable supplied.
- Connect E.V.R Adjustment box to IBM-PC (PS2 or AT type) using standard RS-232C cable.

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)NOI Co.	
*****	*****
3. SWAIT ADJ.	13.1. BURST PHASE
4. VS SC FREQUENCY	14.1. CARRIER Nch
5. (1) G/L H PHASE2	14.2. CARRIER Bch
6. (2) G/L H PHASE4	14.3. CARRIER Rch
7. (3) G/L H PHASE2	14.4. CARRIER Bch
8. (4) V PHASE FOR 350,324	15. (A). 1.0W MANU OFFSET R
9. (A). LOW CLIP	15. (A). 2.0W MANU OFFSET R
10. (B). 08	15. (B). 1.0W ATW OFFSET R
11. (A). AGC OFF GAIN FOR ALC	15. (B). 2.0W ATW OFFSET R
12. (B). ALC DC	16. (C). 1.0W ATW LIMIT Rch
13. (C). TSPRST2_IRIS FOR ALC	16. (C). 2.0W ATW LIMIT Rch
14. (D). TSPRST1_IRIS FOR ALCALC	16. (A). 1.3200K R_GAIN
15. (E). TSPRST2_ELC FOR ELC	16. (A). 2.3200K R_GAIN
16. (F). AGC OFF GAIN FOR ELC	16. (A). 3.3900K PHASE
17. (G). TSPRST2_ELC FOR ELCALC	16. (B). 1.9100K R_GAIN
18. (H). 08	16. (B). 2.9100K R_GAIN
19. (A). V LEVEL 1-byte	17. HIGHLIGHT CHROMA CLIP
20. (B). 08	
21. AGC ON (MAX GAIN)	
<CONTENTS> 0.00+0.01 FOR ONLY 350,324,350,324	
< INSTRUCTION > PLEASE CHOOSE MENU DATA BY ARROW-KEY	
LOAD(F1)	QUIT(F3)
SAVE(F2)	

- Insert new disk containing Dos operating system and E.V.R Adjustment Program into IBM-PC and turns on power of IBM-PC.
- At the prompt, type **ADJS CL350E** and press **ENTER**, following initial menu for adjustment will be displayed.
- Press **LOAD (F1)** and type **CL350E. EVR** (if using WV-CL350E), and press **ENTER** for presetting adjustment of the camera.

(2) +5V adjustment (WV-CL350/354 only)

Test Point : TP4 (+5V) Drive board
Adjust : EEPROM (3D)

- Press ENTER key.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCL)
*****

2.5V±0.1 ADJ.
5.00±0.01 FOR ONLY 350,354

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 03D
<DATA> : 00 → 00
<MESSAGE> :

<INSTRUCTIONS> ADJUST DATA BY ARROW KEYS. ROLLOVER : PREVIOUS ITEM
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Connect digital voltmeter to TP4 (+5V).
- Adjust data by **ARROW** keys so that voltage becomes $+5.0V \pm 0.01V$.
- Press ENTER key for next adjustment.

(3) Sub carrier frequency adjustment

Test Point : TP7 (SC) Sync board
Adjust : EEPROM (3F)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCL)
*****

3.5C FREQUENCY
TP7 (SC) (270C) 413510±5Hz

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 33F
<DATA> : 4C → 4C
<MESSAGE> :

<INSTRUCTIONS> ADJUST DATA BY ARROW KEYS. ROLLOVER : PREVIOUS ITEM
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Connect frequency counter to TP7 (SC).
- Adjust data with **ARROW** keys so that sub carrier frequency becomes $3.579545 \text{ MHz} \pm 5 \text{ Hz}$.
- Press ENTER key for next adjustment.

(4) External Sub carrier frequency adjustment

Test Point : TP7 (SC) Sync board
Adjust : EEPROM (046) Sync board

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCL)
*****

4.75 SC FREQUENCY
TP7 (SC) (270C) 4423618±5Hz

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 046
<DATA> : 04 → 04
<MESSAGE> :

<INSTRUCTIONS> ADJUST DATA BY ARROW KEYS. ROLLOVER : PREVIOUS ITEM
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Supply the black burst signal or composite video signal to GEN-LOCK INPUT connector on the rear of camera.
- Set the Gen-lock termination switch on the rear of camera to ON position.
- Connect the frequency counter TP7 (SC) on the sync board.
- Adjust data with **ARROW** keys so that frequency becomes $4.433618 \text{ MHz} \pm 5 \text{ Hz}$.

(5) Gen-lock H. Phase adjustment

Test Points: VIDEO OUTPUT connector
GEN-LOCK INPUT connector
Adjusts : EEPROM (98)
EEPROM (9A)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCL)
*****

6. (1) 0.75 H PHASE2
0±5

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 098
<DATA> : 00 → 00
<MESSAGE> :

<INSTRUCTIONS> ADJUST DATA BY ARROW KEYS. ROLLOVER : PREVIOUS ITEM
LOAD(F1) QUIT(F2) SAVE(F3)

```

- Confirm the black burst signal or composite video signal is supplied to GEN-LOCK INPUT connector.
- Connect 2 probes of oscilloscope to both VIDEO OUTPUT and GEN-LOCK INPUT connectors.
- Expand the H sync period on the oscilloscope.

(5)-1 Gen-lock H. Phase-2

- Adjust data by **ARROW** keys so that both sync signals are matched ($0 \pm 0.1 \mu\text{sec}$) as shown in Fig. 5-1.

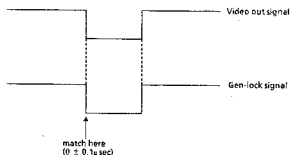
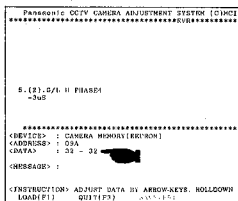


Fig. 5-1

- Press **ENTER** key.

(5)-2 Gen-lock H. Phase-4



- Adjust data by **ARROW** keys so that sync of video out signal leads by $3.0 \pm 0.1 \mu\text{sec}$ from sync of gen-lock signal as shown in Fig. 5-2.

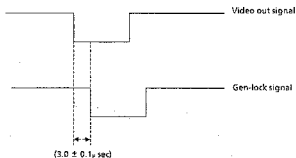
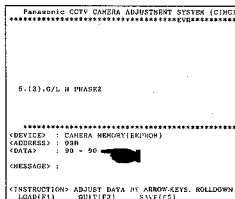


Fig. 5-2

- Press **ENTER** key.

(5)-3 Gen-lock H. Phase-2 (Confirmation)



- Confirm that both sync signals are matched as shown in Fig. 5-1.
- Disconnect black burst signal or composite video signal from GEN-LOCK INPUT connector.
- Press **ENTER** key.

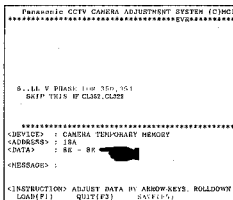
(6) **Line Lock V_o phase adjustment (WV-CL350/354 only)**

Test Points: VIDEO OUTPUT connector

AC Input terminal Power board

Adjusts : RAM (18C)

VR1(V. PHASE) Power board



- Connect 2 probes of oscilloscope to VIDEO OUTPUT connector and AC input terminal on power board. .
- Set the oscilloscope to V rate.
- Adjust data by **ARROW** keys so that decay point of V sync signal delays $2\text{H} \pm 1\text{H}$ from zero cross point of AC power source as shown in Fig. 5-3.

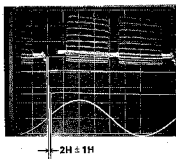


Fig. 5-3

- Press ENTER key.

(7)-A Low clip adjustment

Test Point : RAM (D2)

Adjust : EEPROM (42)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)NCI
*****EVR*****

7.(A).LOW CLIP
(LAOC ON) MEASURE"20h"

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 042
<DATA> : 74 = 74
<MEASURE> : 20
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Adjust data by ARROW keys so that measure level becomes 20.
- Press ENTER key.

(7)-B DB adjustment

Test Point : RAM (D2)

Adjust : EEPROM (BF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)NCI
*****EVR*****

7.(B).DB
MEASURE"20h"

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0BF
<DATA> : 1B = 1B
<MEASURE> : 20
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Confirm that lens iris closes.
- Adjust data by ARROW keys so that measure level becomes 20.
- Repeat adjustment (7)-A and (7)-B until both measure levels become 20.
- Press ENTER key.

(8)-A AGC OFF gain adjustment

Test Point : Pin 3 (AGC OUT) of CNS

Digital board

Adjust : RAM (C0) IC10

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)NCI
*****EVR*****

8.(A).AGC OFF GAIN FOR ALC

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 0C0
<DATA> : 00 = 02
<MESSAGE> :
<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Change lens from automatic iris control lens to manual iris lens.
- Connect oscilloscope to pin 1 (CDS OUT) of CN5 on digital board.
- Aim the camera at logarithmic gray scale chart.
- Adjust lens iris so that CDS output signal at pin 1 of CN5 becomes 460 mV as shown in Fig. 5-4.

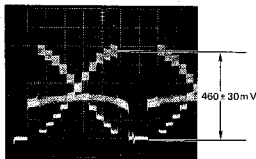


Fig. 5-4

- Change oscilloscope from pin 1 of CN5 to pin 3 of CN5.
- Adjust data by **ARROW** keys so that signal level becomes $600 \pm 30 \text{ mV}$ as shown in Fig. 5-5.

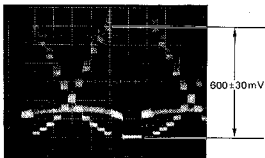


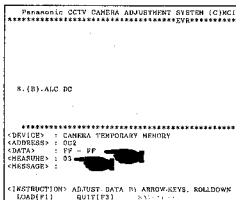
Fig. 5-5

- Change lens from manual iris lens to automatic iris control lens.
- Press **ENTER** key.

(B)-B ALC DC adjustment

Test Point : RAM (D5)
Adjust : RAM (C2)

Note : Installed lens should be DC servo type for this adjustment.



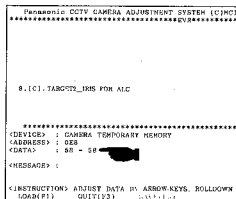
- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that measure level becomes between 03 and 04.
- Press **ENTER** key.

(B)-C BLC preset OFF (Target 2 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CN5

Digital board

Adjust : RAM (E8) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CN5.
- Adjust data by **ARROW** keys so that signal level becomes $460 \pm 30 \text{ mV}$ as shown in Fig. 5-6.

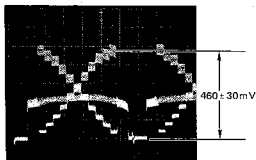


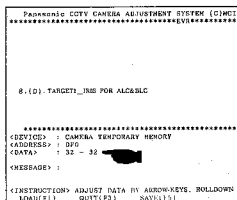
Fig. 5-6

(8)-D BLC preset ON (Target 1 iris) adjustment

Test Point : Pin 1 (CDS OUT) of CNS

Digital board

Adjust : RAM (F0) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 (CDS OUT) of CNS.
- Adjust data by **ARROW** keys so that signal level becomes $460 \pm 30 \text{ mV}$ as shown in Fig. 5-7.

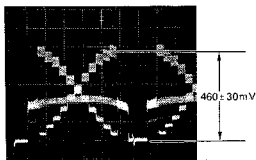


Fig. 5-7

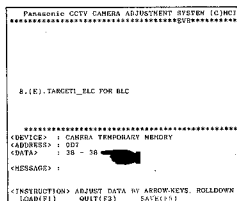
- Press **ENTER** key.

(8)-E BLC Preset ON (Target 1 ELC) adjustment

Test Point : Pin 3 (AGC OUT) of CNS

Digital board

Adjust : RAM (D7)



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 3 of CNS.
- Adjust data by **ARROW** keys so that signal level becomes $460 \pm 30 \text{ mV}$ as shown in Fig. 5-8.

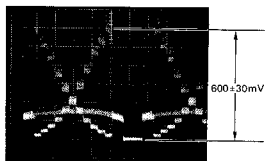


Fig. 5-8

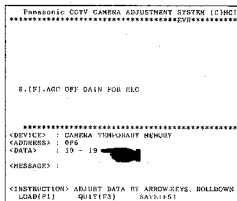
- Press **ENTER** key.

(8)-F AGC OFF gain (ELC) adjustment

Test Point : Pin 1 (CDS OUT) of CNS

Digital board

Adjust : RAM (F6) IC10



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 of CNS.
- Adjust data by ARROW keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-9.

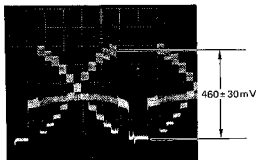


Fig. 5-9

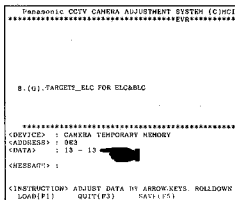
- Press ENTER key.

(8)-G BLC preset OFF (Target 2 ELC) adjustment

Test Point : Pin 1 (CDS OUT) of CNS

Digital board

Adjust : RAM (E3)



- Aim the camera at logarithmic gray scale chart.
- Connect oscilloscope to pin 1 of CNS.
- Adjust data by ARROW keys so that signal level becomes 460 ± 30 mV as shown in Fig. 5-10.

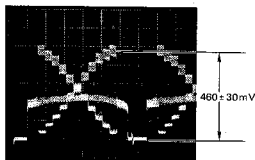


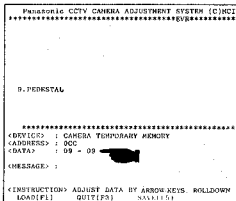
Fig. 5-10

- Press ENTER key.

(9) Pedestal adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (CC)



- Confirm that lens iris closes.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector.
- Adjust data by **ARROW** keys so that signal level becomes $50 \pm 5 \text{ mV}$ as shown in Fig. 5-11.

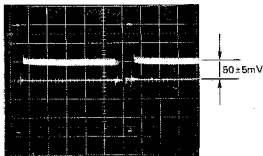
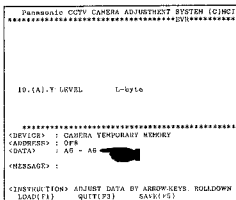


Fig. 5-11

- Press **ENTER** key.

(10)-A Y. level adjustment

Test Point : VIDEO OUTPUT connector
Adjust : RAM (FB)



- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector.
- Adjust data by **ARROW** keys so that signal level becomes $700 \pm 50 \text{ mV}$ ($98 \pm 7 \text{ IRE}$) as shown in Fig. 5-12.

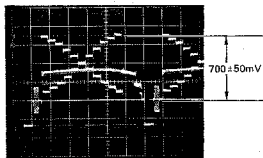
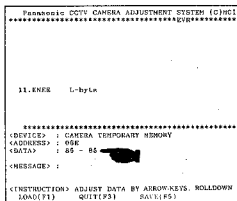


Fig. 5-12

- Press **ENTER** key.

(11) Knee level adjustment

Test Point : VIDEO OUTPUT connector
Adjust : RAM (6E)



- Aim the camera at logarithmic gray scale chart.
- Connect waveform monitor or terminated oscilloscope to VIDEO OUTPUT connector
- Adjust data by **ARROW** keys so that signal level becomes $840 +35\text{mV}$ ($117 +5 \text{ IRE}$) as shown in Fig. 5-13.

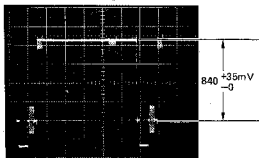
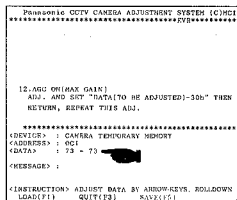


Fig. 5-13

(12) AGC ON (Max gain) adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (C1)



- Change lighting from 1400 lux to 3 lux
- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that signal level becomes $280 \pm 35 \text{ mV}$ ($39.2 \pm 4.9 \text{ IRE}$), and note this data as (a).
- Re-adjust data by **ARROW** keys so that data becomes (b).
(a)-30h = (b)

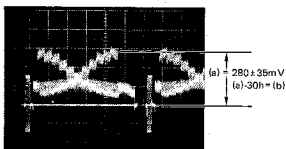


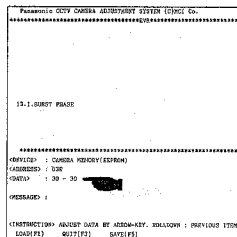
Fig. 5-14

- Change lighting from 3 lux to 1400 lux.
- Press **ENTER** key.

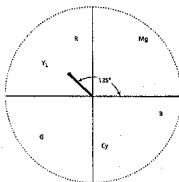
(13)-1 Burst phase adjustment

Test Point : VIDEO OUTPUT connector

Adjust : EEPROM (3E)



- Adjust data by **ARROW** keys so that burst phase becomes 135° .



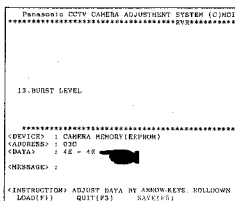
- Press **ENTER** key.

Fig. 5-15

(13)-2 Burst level adjustment

Test Point : VIDEO OUTPUT connector

Adjust : EEPROM (3C)



- Aim the camera at logarithmic gray scale chart.
- Adjust data by **ARROW** keys so that burst level becomes $300 \pm 10 \text{ mV}$ ($42 \pm 1.4 \text{ IRE}$) as shown in Fig. 5-16.

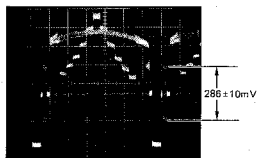


Fig. 5-16

- Press **ENTER** key.

(14) R. B carrier balance adjustment

Test Point : VIDEO OUTPUT connector

Adjust : C. DSP (17)

C. DSP (18)

- Set the gain of vectorscope to maximum.

(14)-1 R. Carrier balance adjustment (AGC-OFF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****EVID*****

14.1.CARRIER Bal
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 017
<DATA> : 05 - 05
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.

(14)-2 B. Carrier balance adjustment (AGC-OFF)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****EVID*****

14.2.CARRIER Bal
(AGC OFF), REPEAT THIS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 018
<DATA> : 06 - 06
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (14)-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-17.

Positions at center



Fig. 5-17

(14)-3 R. Carrier balance adjustment (AGC-ON)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****EVID*****

14.3.CARRIER Bal
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 017
<DATA> : 05 - 05
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope
- Press **ENTER** key.

(14)-4 B Carrier balance adjustment (AGC-ON)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****EVID*****

14.4.CARRIER Bal
(AGC ON), REPEAT PREVIOUS ADJ.

*****
<DEVICE> : CHROMA DSP
<ADDRESS> : 018
<DATA> : 06 - 06
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (14)-3, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-18.

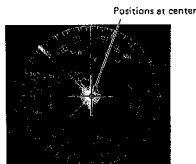


Fig. 5-18

(15)-A White balance manual offset adjustment

Test Point : VIDEO OUTPUT connector
 Adjust : RAM (8C)
 RAM (8D)

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

(15)-A-1 R. White balance manual offset adjustment

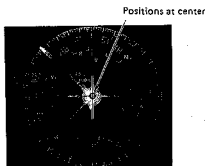
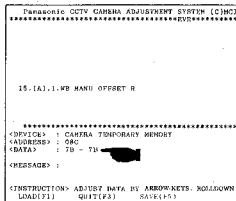
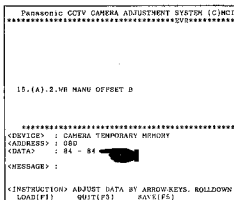


Fig. 5-19

(15)-A-2 B. White balance manual offset adjustment



- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (15)-A-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-19.

(15)-B ATW offset adjustment

Test Point : VIDEO OUTPUT connector
 Adjust : EEPROM (40) IC7
 EEPROM (41) IC7

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.

- Aim the camera at white chart.
- Set the gain of vectorscope to maximum.

(15)-B-1 R. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)HUI
*****EVE*****

15.(B).1.WB ATW OFFSET R

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 040
<DATA>   : 59 - 60
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1)      QUIT(F2)      SAVE(F3)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.

(15)-B-2 B. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)HUI
*****EVE*****

15.(B).2.WB ATW OFFSET B

*****
<DEVICE> : CAMERA MEMORY (EEPROM)
<ADDRESS> : 041
<DATA>   : 68 - 68
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1)      QUIT(F2)      SAVE(F3)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope.
- Press **ENTER** key.
- If the vector does not position at the center of vectorscope, press **PG DN** key twice to return to (15)-B-1, and repeat above procedure until vector positions at the center of vectorscope as shown in Fig. 5-20.

Positions at center



Fig. 5-20

(15)-C ATW limit adjustment

Test Point : VIDEO OUTPUT connector

Adjust : RAM (8A)

RAM (8B)

- Aim the camera at white chart.
- Set CC filter (C12+C4) which converts form 3200°K to 6500°K in front of lens.

(15)-C-1 R. ATW offset adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)HUI
*****EVE*****

15.(C).1.WB ATW LIMIT Rch

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 00A
<DATA>   : 38 - 38
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW-KEYS, ROLLDOWN
LOAD(F1)      QUIT(F2)      SAVE(F3)

```

- Adjust data by **ARROW** keys so that vector positions at the center of vectorscope
- Press **ENTER** key.

(15)-C-2 B. ATW offset adjustment

```

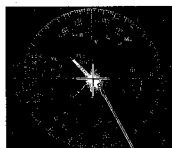
Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****[*****]*****

15. (C). 2-WB ATW LMTW Reb

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 086
<DATA> : 47 - 47
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLODOWN
LOAD(F1)  QUIT(F3)  SAVE(F5)
    
```

- Adjust data by **ARROW** keys so that vector shifts 10% (Burst = 100%) to Cyan side on vectorscope.
- Press **ENTER** key.
- If the vector does not shift 10% (Burst = 100%) to cyan side on vectorscope, press **PG DN** key twice to return to (15)-C-1, and repeat above procedure until vector shifts 10% to cyan side on vectorscope as shown in Fig. 5-21.



Shifted approx. 10%

Fig. 5-21

- Remove CC filter from in front of lens.

(16)-A White balance adjustment (3200°K)

Test Point : VIDEO OUTPUT connector
 Adjust : RAM (8E)
 RAM (8F)
 RAM (18B)

- Aim the camera at color chip chart.
- Set the gain of vectorscope to 75% position.

(16)-A-1 R. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****[*****]*****

16. (A). 1. 3200K R_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08E
<DATA> : 6F - 6F
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLODOWN
LOAD(F1)  QUIT(F3)  SAVE(F5)
    
```

- Adjust data by **ARROW** keys so that red gain becomes $200 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.

(16)-A-2 B. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****[*****]*****

16. (A). 2. 3200K B_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 08F
<DATA> : 6B - 5B
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLODOWN
LOAD(F1)  QUIT(F3)  SAVE(F5)
    
```

- Adjust data by **ARROW** keys so that yellow gain becomes $100 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.

(16)-A-3 Chroma phase adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (CINCI)
*****[*****]*****

16. (A). 3. 3200K PHASE

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 18B
<DATA> : 40 - 40
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. ROLLODOWN
LOAD(F1)  QUIT(F3)  SAVE(F5)
    
```

- Adjust data by **ARROW** keys so that both red vectors watch ($0 \pm 1^\circ$).
- Press **ENTER** key.
- If the chrominance phase and gain should not be adjusted to proper position, press **PG DN** key 3 times to return to (16)-A-1, and repeat above procedure until they are adjusted to proper position as shown in table-2.

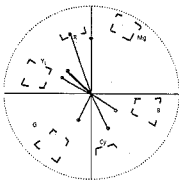


Fig. 5-22

	Red	Yellow
Phase	$104 \pm 2^\circ$	$157 \pm 5^\circ$
gain	$200 \pm 5\%$	$100 \pm 5\%$

Table-2

(16)-B White balance adjustment (5100°K)

Test Point : VIDEO OUTPUT connector

Adjust : RAM (90)

RAM (91)

- Aim the camera at color chip chart.
- Set CC filter (C12) which converts from 3200°K to 5100°K in front of lens.

(16)-B-1 R. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****ZV*****

16.(B).1.5100K R_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 090
<DATA> : 63 - 63
<MESSAGE> :
*****
<INSTRUCTION> ADJUST DATA BY ARROW KEYS. BOLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that red gain becomes $200 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.

(16)-B-2 B. Gain adjustment

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MCI
*****ZV*****

16.(B).2.5100X B_GAIN

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : 091
<DATA> : 68 - 68
<MESSAGE> :
*****
<INSTRUCTION> ADJUST DATA BY ARROW KEYS. BOLLDOWN
LOAD(F1) QUIT(F3) SAVE(F5)

```

- Adjust data by **ARROW** keys so that yellow gain becomes $90 \pm 5\%$ (Burst = 100%).
- Press **ENTER** key.
- If the chrominance gain and phase should not be adjusted to proper position, press **PG DN** key twice to return to (16)-B-1, and repeat above procedure until they are adjusted to proper position as shown in table 3.

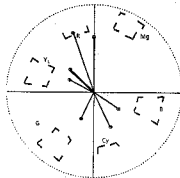


Fig-5-23

	Red	Yellow
Phase	$104 \pm 2^\circ$	$157 \pm 5^\circ$
gain	$200 \pm 5\%$	$90 \pm 5\%$

Table-3

- Remove CC filter (C12) from in front of lens.

(17) Highlight chroma clip

Test Point : VIDEO OUTPUT connector

Adjust : RAM (AA)

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MDI
*****EVR*****

17.HIGHLIGHT CHROMA CLIP
SET "DATA(ADJUSTED)-05h(MARGIN)"

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : DAA
<DATA> : 90 - 90
<MESSAGE> :

<INSTRUCTION> ADJUST DATA BY ARROW KEYS. BOLD DOWN
LOAD(F1) QUIT(F3) SAVE(F5)
    
```

- Aim the camera at white chart.
- Adjust data by **ARROW** keys so that chrominance level becomes just minimum, and note this data as (a).
- Re-adjust data by **ARROW** keys so that data becomes (b).
(a)-05h = (b)

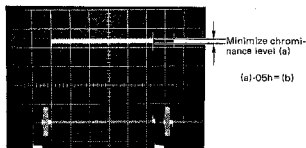


Fig.5-23

- After finishing adjustment, press **QUIT (F3)**.

```

Panasonic CCTV CAMERA ADJUSTMENT SYSTEM (C)MDI
*****EVR*****

17.HIGHLIGHT CHROMA CLIP
SET "DATA(ADJUSTED)-05h(MARGIN)"

*****
<DEVICE> : CAMERA TEMPORARY MEMORY
<ADDRESS> : DAA
<DATA> : 90 - 90
<MESSAGE> :

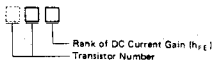
< SAVE CAMERA DATA TO FILE:***.EVR ? Y/N >
LOAD(F1) QUIT(F3) SAVE(F5)
    
```

- Press **N** and **ENTER** to finish
- Disconnect cable from CN6 on the digital board.
- Confirm that masking is off.
- If not, set the masking off while referring to page 7
- Press Right (8), Left (9) and Set (11) Switches on the rear panel at the same time for resetting.

CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.



Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	25B700	X	25D602A
B	25B709A	Y	25D601
C	25B710	Z	25D601A
D	25B710A	1Z	25D1030
E	25A1022	1N	25K199
F	25A1034	1O	25K198
H	25A1035	1A	25B799
I	25B792	1B	25B814
K	25C2778	1C	25B902
P	25D614	1F	25K321
Q	25D613	1L	25K247
R	25C2480	1K	25K315
S	25C2405	1M	25J84
T	25C2406	1T	25C3077
U	25C2404	1X	25C2845
V	25C2295	2B	25K374
W	25D602	2C	25K116

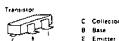
Example

WQ → 25D602 - Q

YQ → 25D601 - Q

1BS → 25B814 - S

Appearance and Symbols



	1	2	3
Except 25K199	Drain	Source	Gate
25K199	Gate	Drain	Source

2. Chip Diode

The diode number is indicated on the top surface of the chip diode using two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28-A	MN	MA151WA
ME	MA28-B	MO	MA152WA
MF	MA28W-A	MT	MA151WK
MM	MA151K	MU	MA152WK

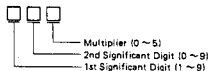
Appearance and Symbols



	1	2	3
MA28/28W/28T	--	Anode	Cathode
MA151K/152K	--	Anode	Cathode
MA151A/152A	--	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 → 33 × 10⁰ = 33 ohms

561 → 56 × 10¹ = 560 ohms

123 → 12 × 10³ = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

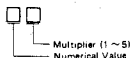
EXAMPLE:

0.5 → 0.5 pF 2.5 → 2.5 pF

75 → 0.75 pF 33 → 33 pF

1 → 1 pF 82 → 82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

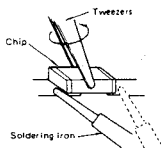
- A1 $\rightarrow 10 \times 10^1 = 100 \text{ pF}$
 N2 $\rightarrow 33 \times 10^2 = 3300 \text{ pF}$
 S3 $\rightarrow 47 \times 10^3 = 47000 \text{ pF}$

5. Precautions in replacing the chip component

1. Make sure that the unit is turned OFF when replacing the chip.
2. Use tweezers to prevent any damage to the chip surface.
3. Do not re-use the chips after removal.
4. Do not rub the electrode of chips.
5. Do not subject the chips to excessive stress.
6. It is recommended that a pencil-type soldering iron to be used.
7. The solder whose diameter is less than 0.5 mm is recommended.
8. Do not heat the chip beyond 3 seconds.
9. Maintain temperature control under 260°C (500°F) when soldering.

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1. Add the solder to both ends of the chip (three leads for chip transistor).
 2. While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers.
- Note: Be careful not to damage other chips.

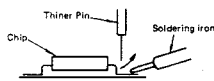


5-2 Removal (IC)

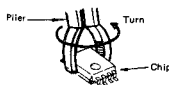
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thinner pin.

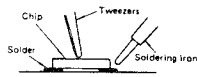


3. Remove IC turning it with plier.

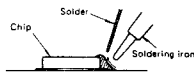


5-3 Mounting

1. Place the solder thinly on the chip mounting foil.
2. Solder the chip temporarily while holding the chip with the tweezers.

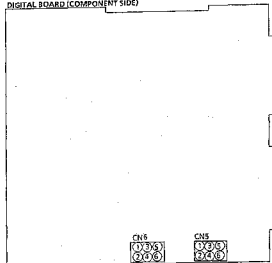


3. Solder both ends of chip (three leads for chip transistor).

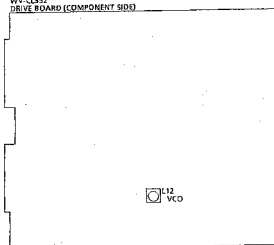


LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

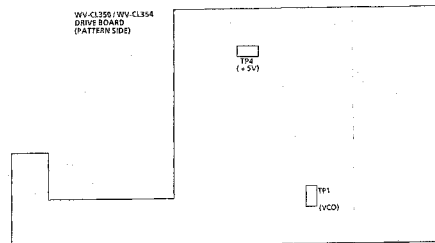
DIGITAL BOARD (COMPONENT SIDE)



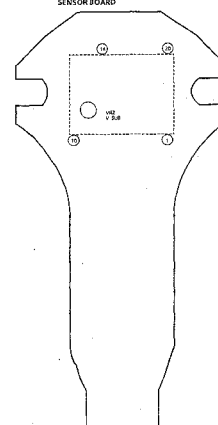
WV-CL352
DRIVE BOARD (COMPONENT SIDE)



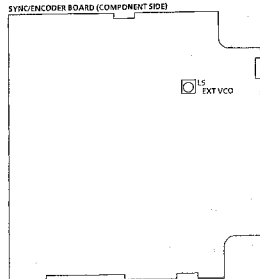
WV-CL355 / WV-CL354
DRIVE BOARD
(PATTERN SIDE)



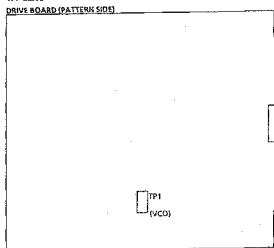
SENSOR BOARD



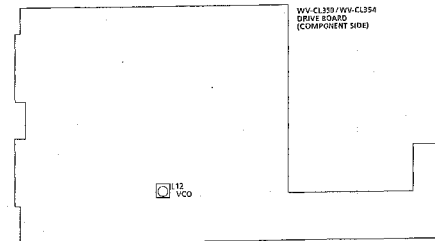
SYNC/ENCODER BOARD (COMPONENT SIDE)



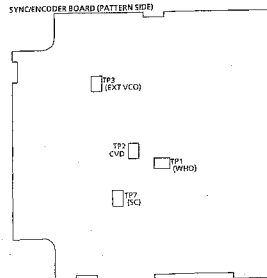
WV-CL352
DRIVE BOARD (PATTERN SIDE)



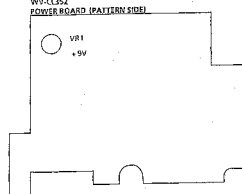
WV-CL355 / WV-CL354
DRIVE BOARD
(COMPONENT SIDE)



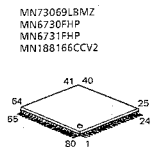
SYNC/ENCODER BOARD (PATTERN SIDE)



WV-CL352
COVER BOARD (PATTERN SIDE)



APPEARANCE OF IC, TRANSISTOR AND DIODE



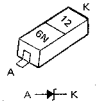
NJM319M



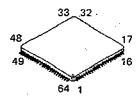
25B1218-QRS
25B1462
25C4618
25C4627
25D2216
FA3L42T1B



MA372



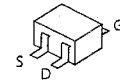
AN2254FAP
MN65701FHP
YWM862148BU



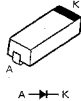
YWCXA1839M
NJM2904M
NJM3414M
NJM4558M



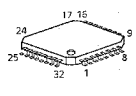
25K622-PQR



YWF1H4TP



AN2015FAP



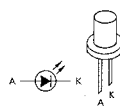
YWM6M86021FP
YWM62352GP



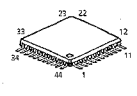
25R766-RS
25D875-QRS



LN277RPX



MN53020LB01



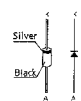
YWTC7508S
YWTC7533FR
YWTC4569F
YWM5237ML



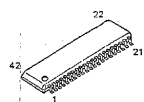
XP1501
XP4501



YWERA1502



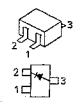
M50554254PF



YWUPC1093



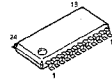
MA132K



YW51V640



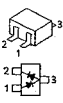
YWCKD1175AM



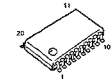
YWMA1020



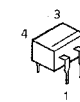
MA133



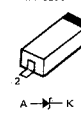
MN53003LB



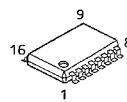
PS25011KL



MA8110
MA8200



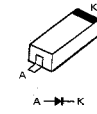
YWUPD16501GS

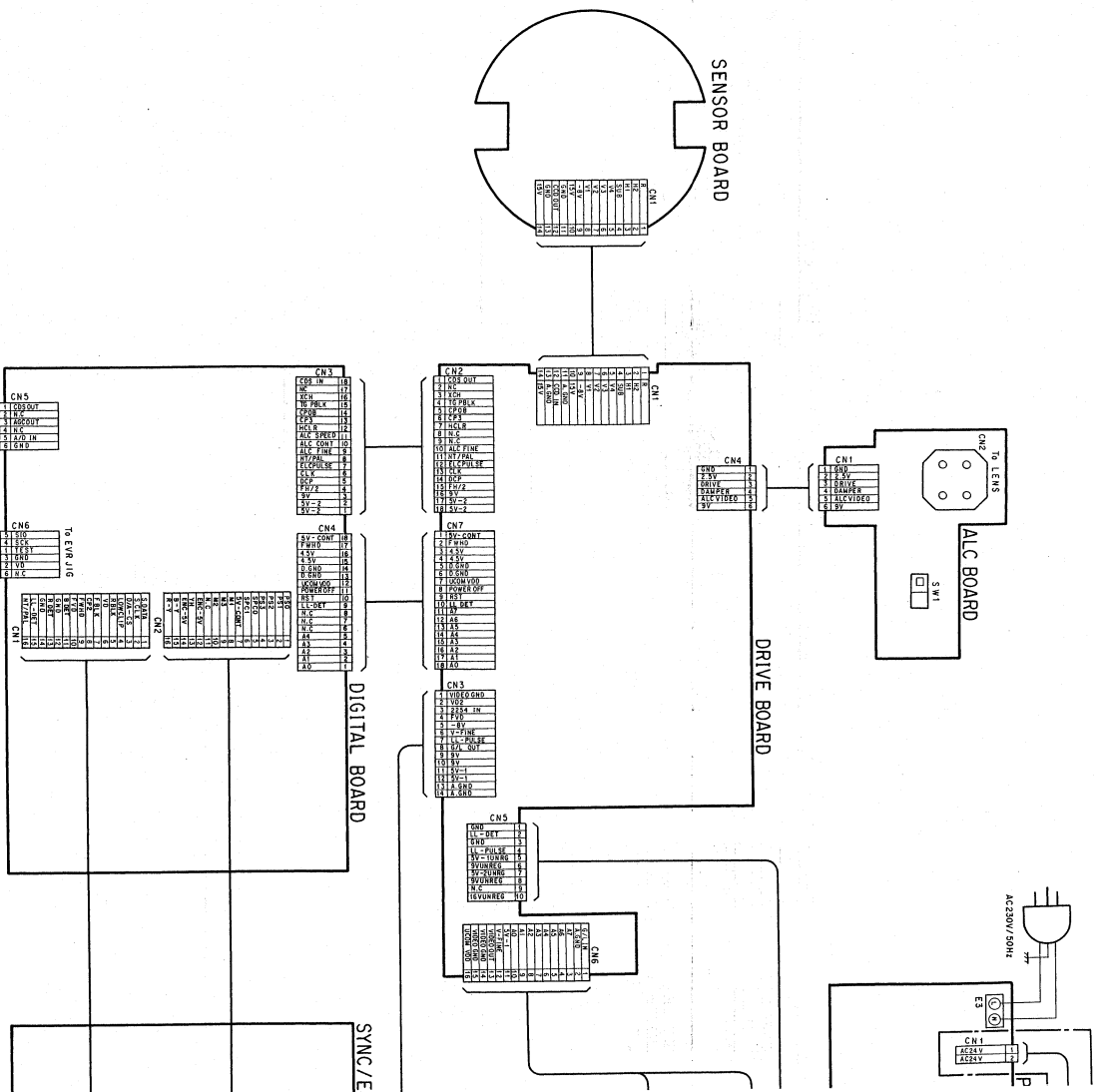


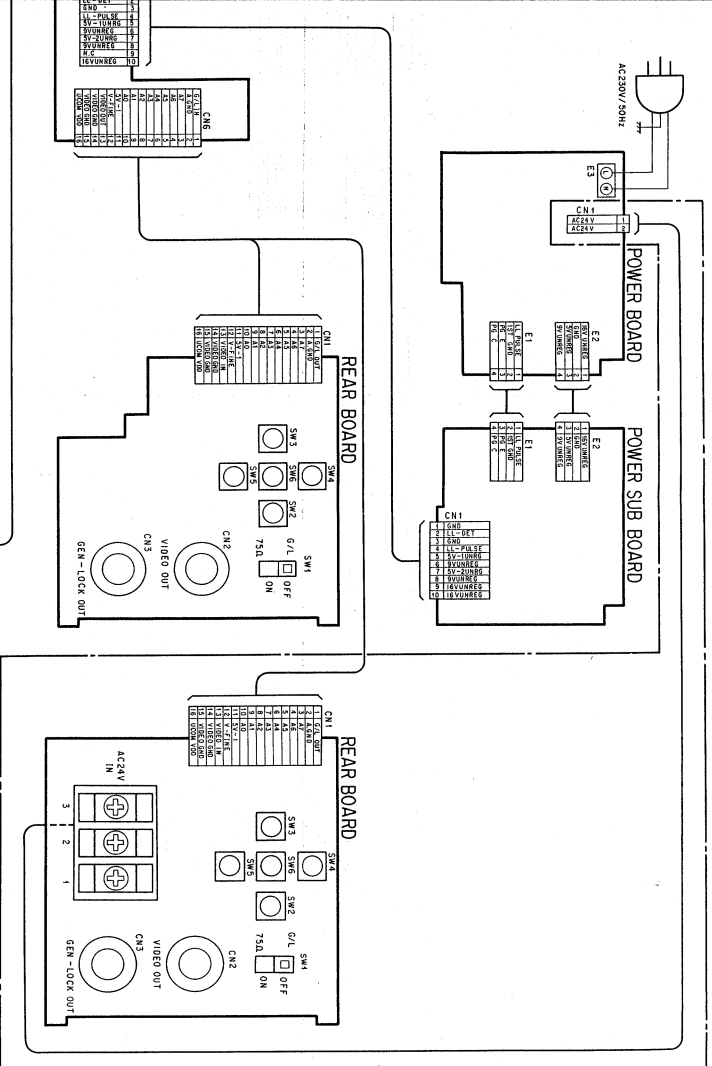
MN13821PQR



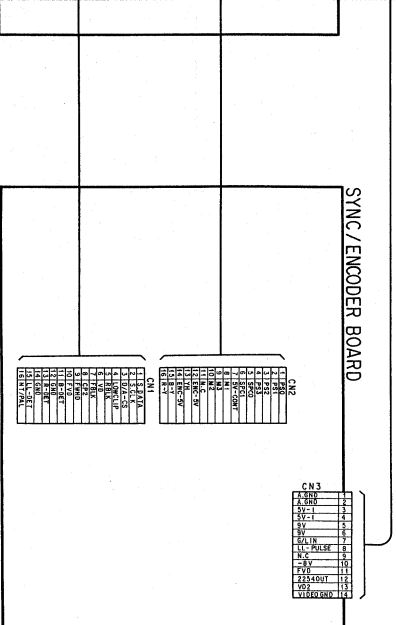
MA729

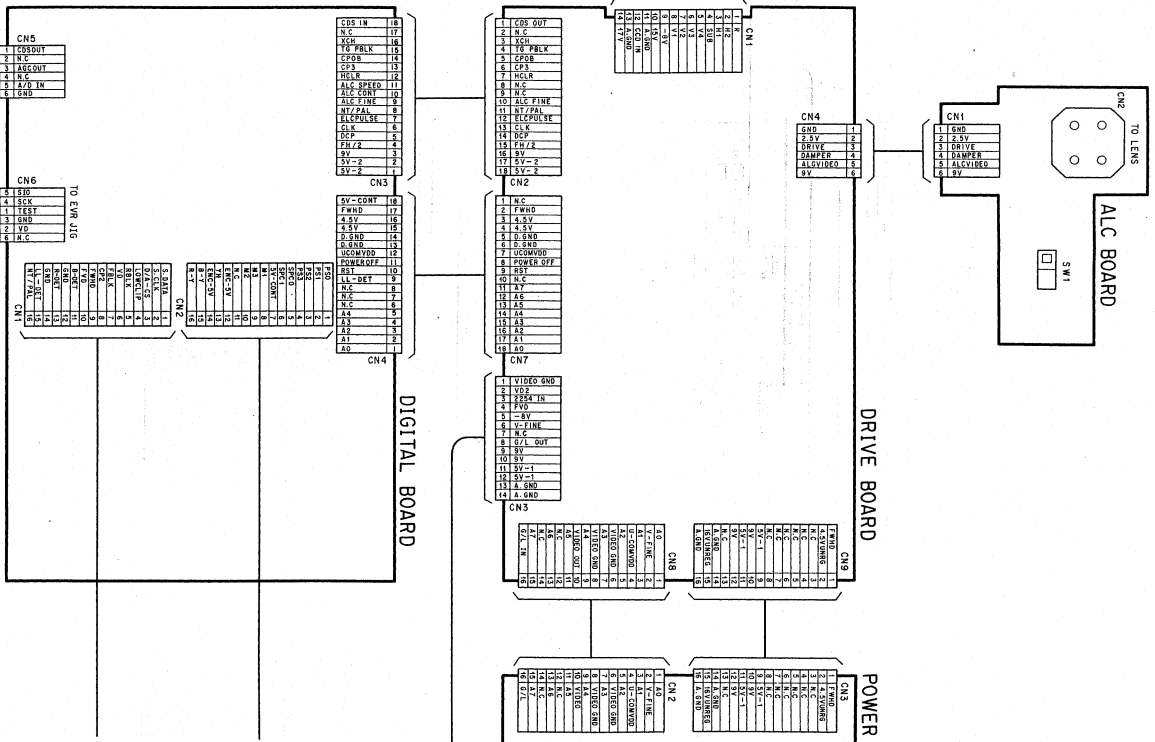






WV-CL354E ONLY





BLOCK DIAGRAM OF DIGITAL BOA

DIGITAL BOARD

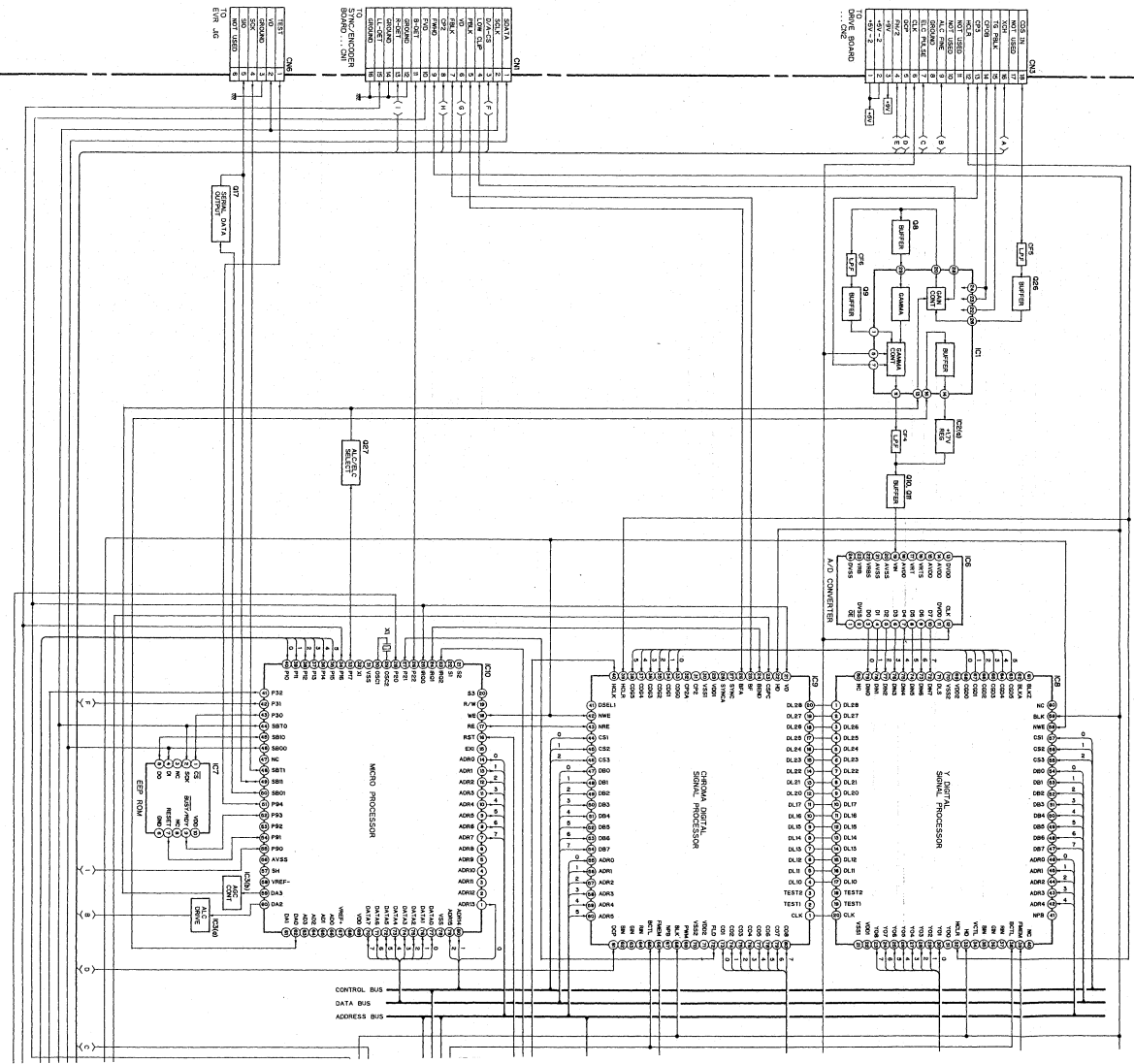
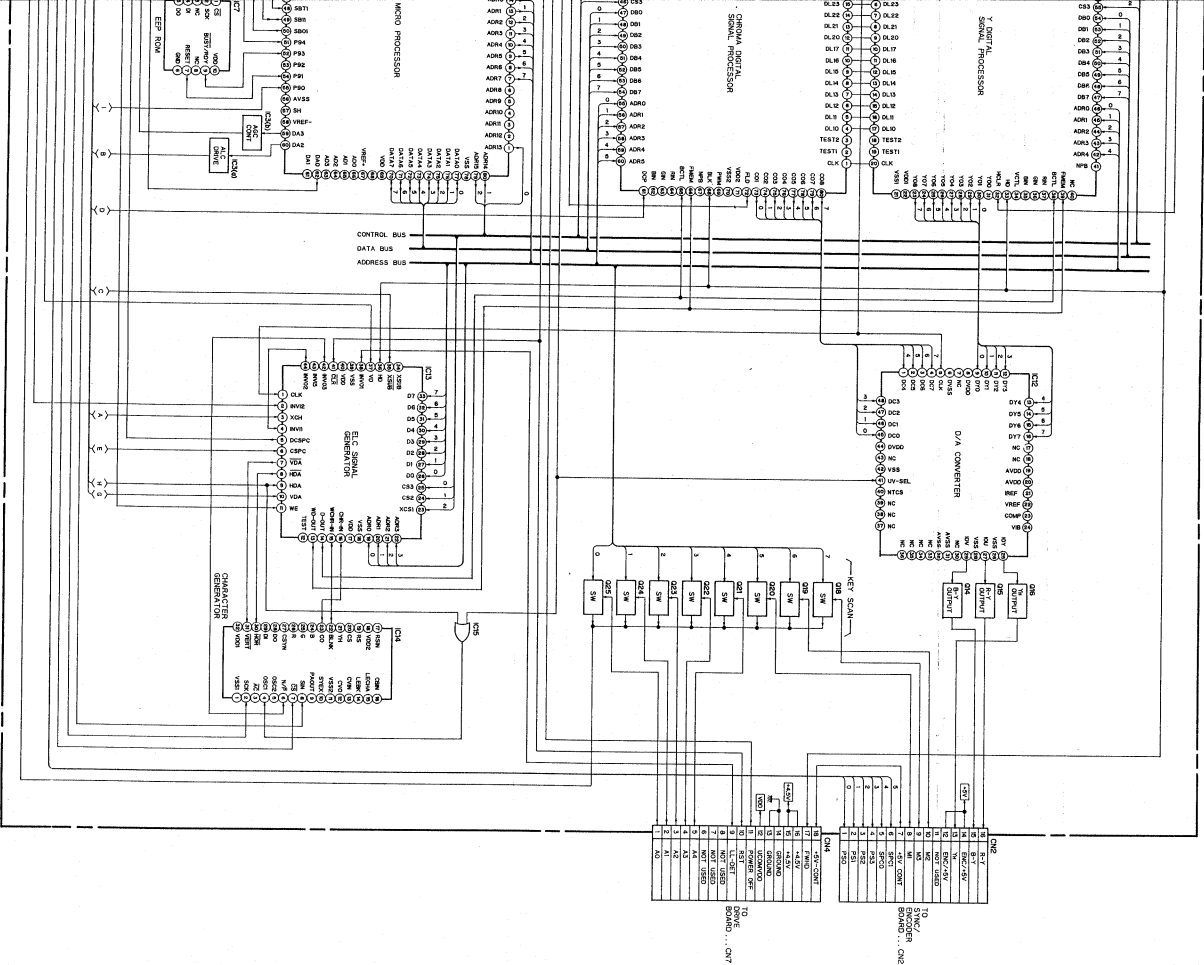
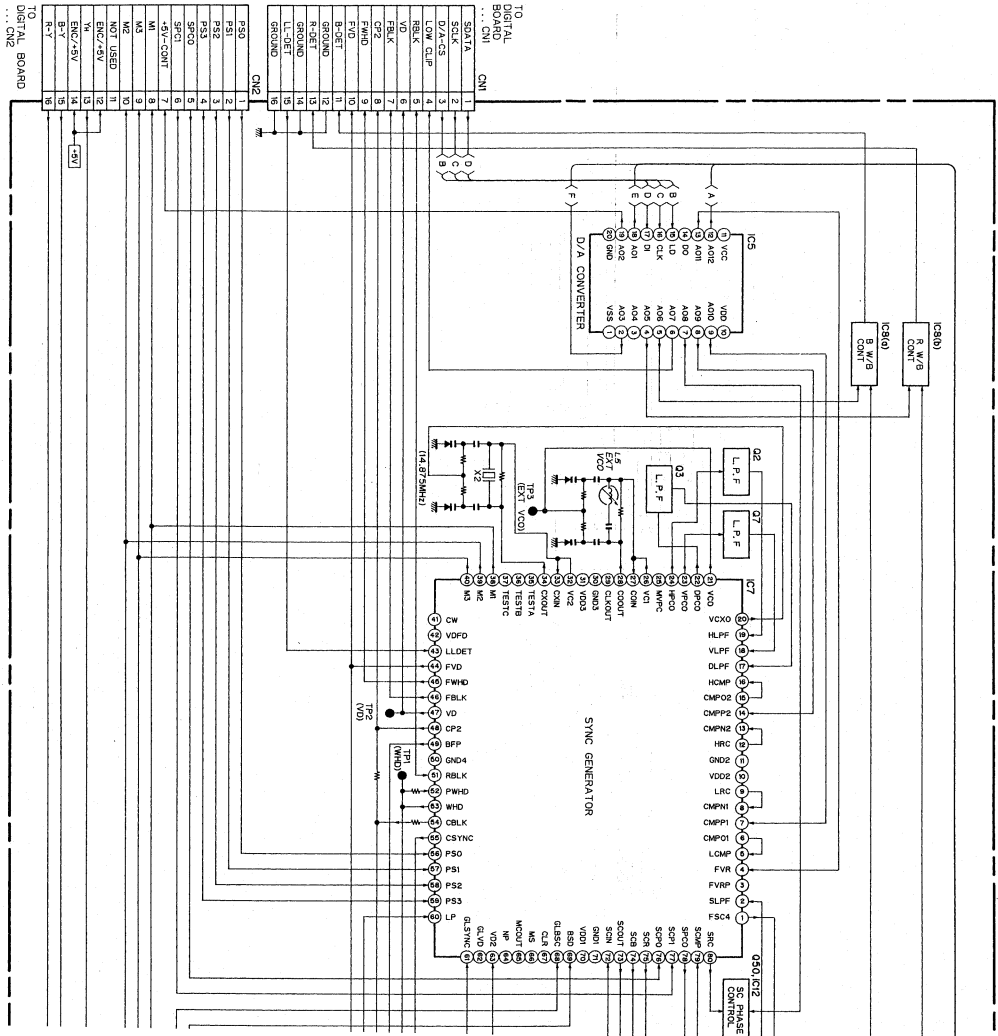


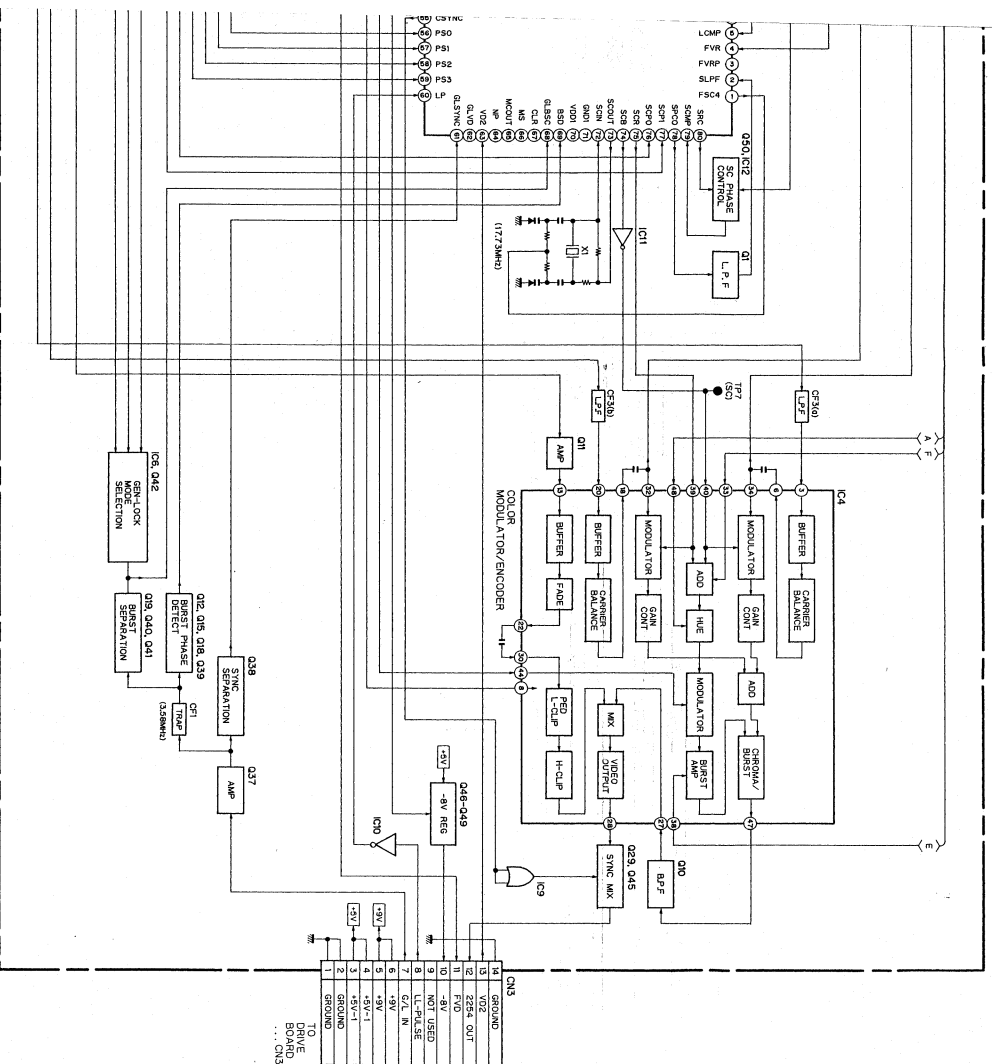
DIAGRAM OF DIGITAL BOARD



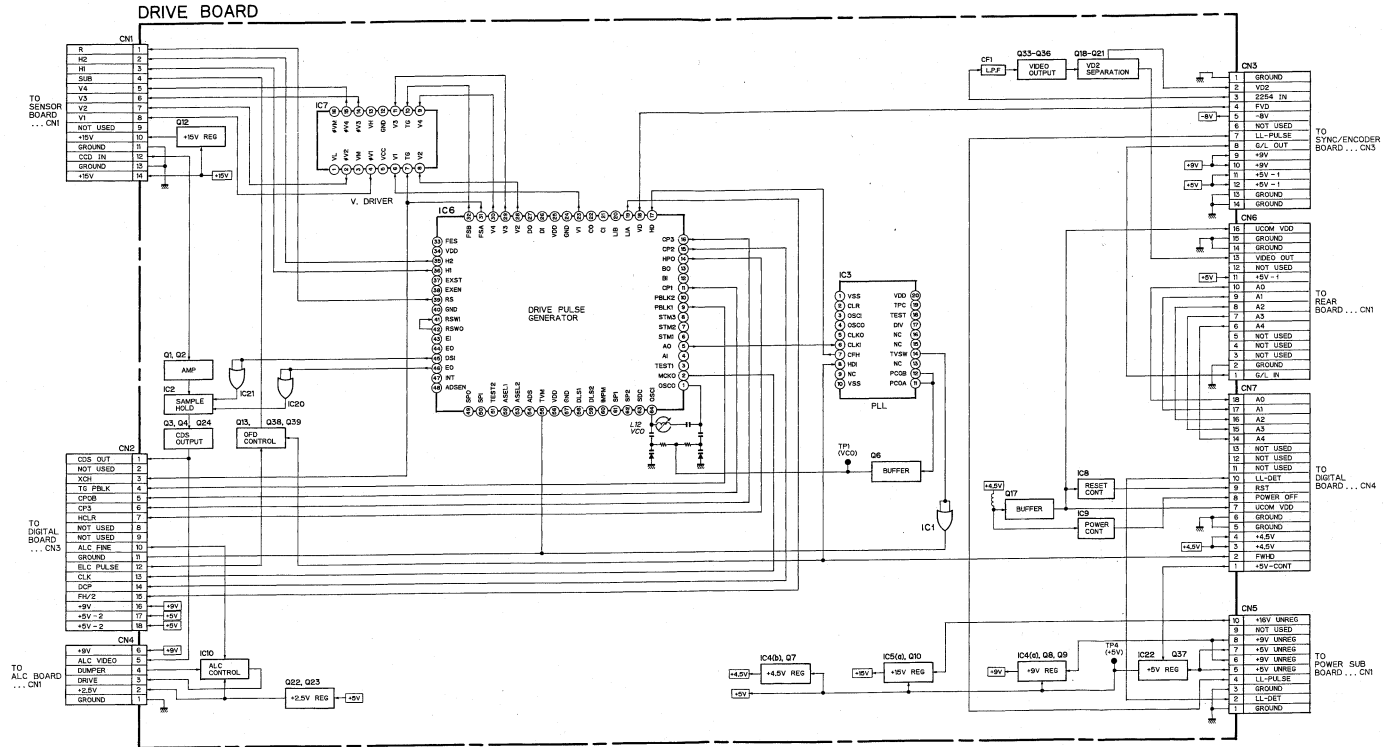
SYNC/ENCODER BOARD



AM OF SYNC/ENCODER BOARD



BLOCK DIAGRAM OF DRIVE BOARD (WV-CL350/WV-CL354)

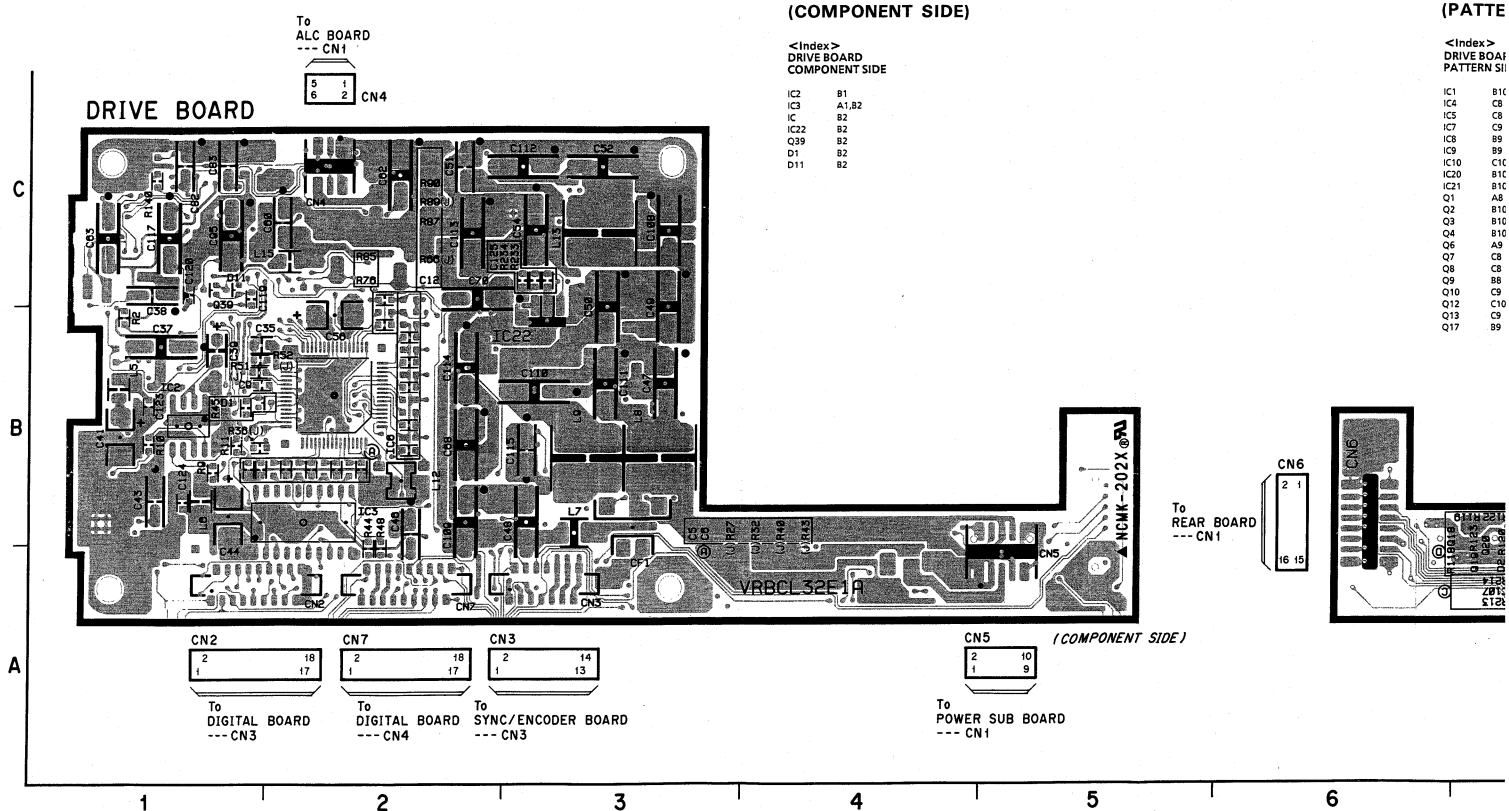


BLOCK DIAGRAM OF DRIVE BOARD (WV-CL352)



WV - CL352

CONDUCTOR VIEW OF DRIVE BOARD FC



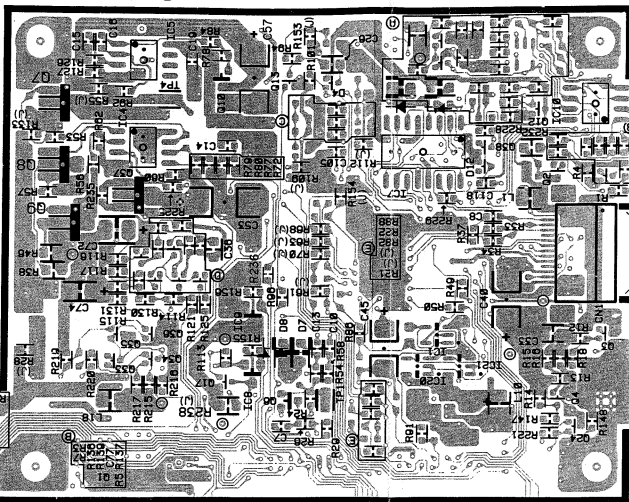
BOARD FOR WV-CL350/WV-CL354

(PATTERN SIDE)

<Index>
DRIVE BOARD
PATTERN SIDE

IC1	B10	Q18	B7
IC4	C8	Q19	B7
IC5	C8	Q20	B7
IC7	C9	Q21	B7
IC8	B9	Q22	B7
IC9	B9	Q23	B8
IC10	C10	Q24	A10
IC20	B10	Q33	A8
IC21	B10	Q34	A9
Q1	A8	Q35	A8
Q2	B10	Q36	A9
Q3	B10	Q37	C8
Q4	B10	Q38	C10
Q6	A9	D2	A7
Q7	C8	D4	C9
Q8	C8	D5	A7
Q9	B8	D6	A7
Q10	C9	D7	B9
Q12	C10	D8	B9
Q13	C9	D12	C10
Q17	B9		

DRIVE BOARD



(PATTERN SIDE)

	IC1	IC2	IC3	IC4	IC5	IC7	IC8	IC9	IC10	IC20	IC21	IC22
Pin1	2.9	4.8	0	0	9.4	-7.8	0	0	2.3	1.3	1.1	5.6
2	2.9	2.6	4.8	0.2	4.8	-7.5	4.4	4.5	2.3	1.3	1.1	0
3	0.5	2.6	0	0.3	4.8	0	4.5	4.5	2.3	0	0	5.0
4	2.9	4.8	4.8	0	0	-0.2			0	0.5	0.4	
5	5.4	1.2	0	4.8	1.9	4.8			2.3	4.8	4.8	
6		1.2	2.3	4.8	1.9	0.1			2.3			
7		0	0.4	5.0	4.2	4.8			4.1			
8		1.8	0.6	8.8	17.4	0			0			
9		0										
10		0							4.8			
11		2.0							4.6			
12		2.0							0			
13		0							14.6			
14		0							-7.4			
15		0							00.2			
16		0							0			
17		4.8										
18		4.8										
19		4.8										
20		4.8										

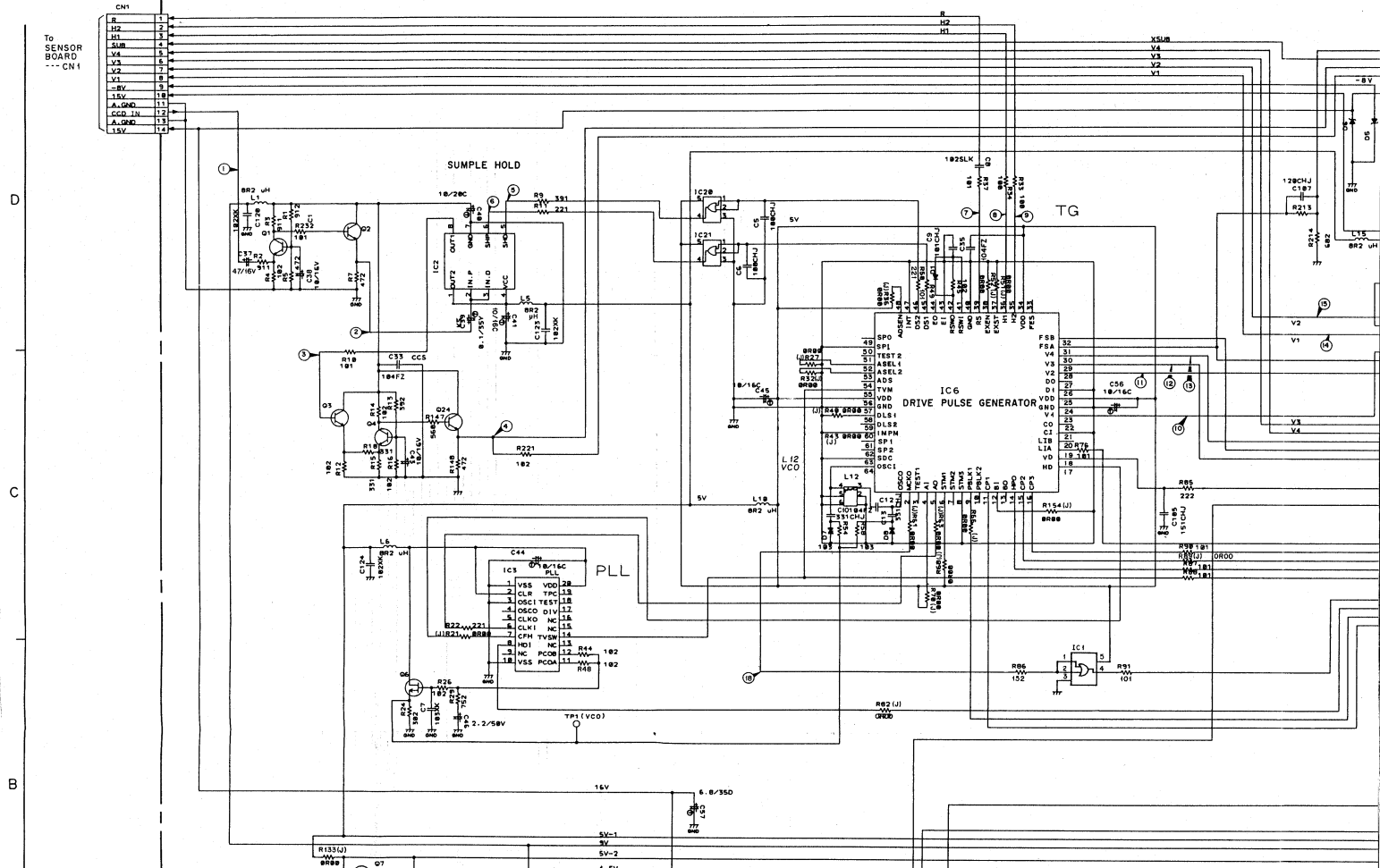
	IC6	IC5
Pin1	0	Pin33 4.7
2	2.0	34 4.8
3	0	35 1.8
4	0	36 2.4
5	0	37 0
6	4.8	38 0
7	0	39 1.5
8	0	40 0
9	0	41 1.1
10	0.7	42 8.5
11	0	43 0
12	0	44 0
13	0	45 1.1
14	0.5	46 1.4
15	0.1	47 0
16	0	48 4.8
17	0.4	49 0
18	0.1	50 0
19	2.4	51 0
20	2.4	52 0
21	0	53 0
22	4.8	54 4.8
23	0.1	55 0
24	0	56 0
25	4.8	57 0
26	0	58 0
27	4.8	59 0
28	4.6	60 0
29	4.6	61 0
30	0.1	62 0
31	4.8	63 0
32	4.8	64 0

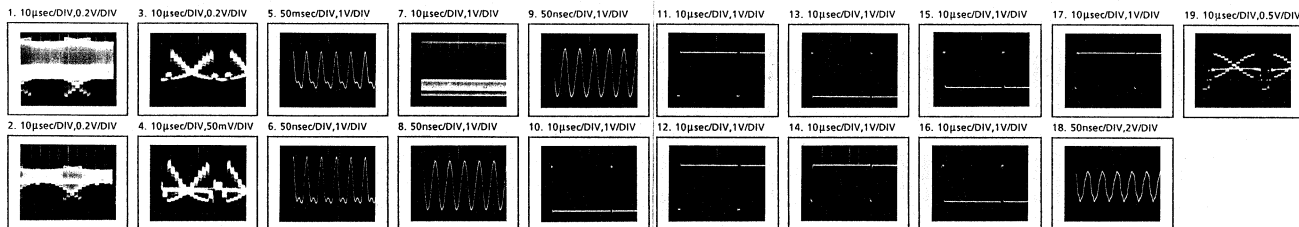
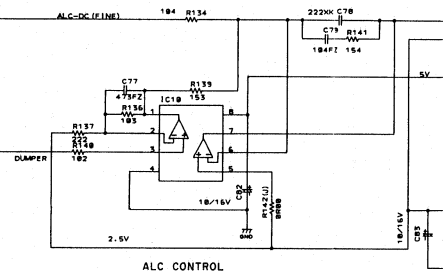
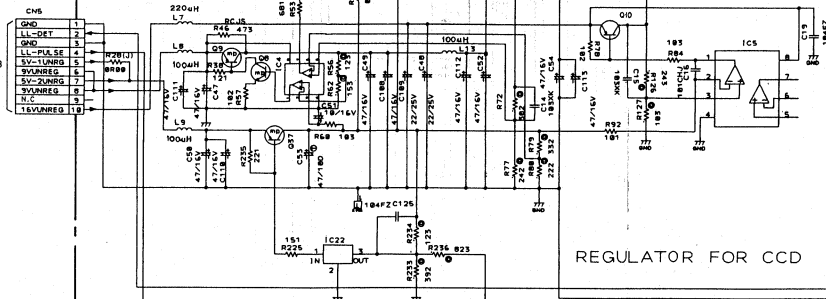
	B	C	E
Q1	3.0	6.9	2.2
2	8.6	8.7	7.9
3	1.7	8.7	1.4
4	1.7	5.4	1.05
5	2.3	2.0	4.8
6	4.3	4.5	5.0
8	6.7	10.0	6.1
9	10.0	9.1	10.1
10	15.2	16.6	14.6

	B	C	E
12	15.2	16.6	14.6
13	0.1	7.1	0
17	3.6	4.3	4.4
18	6.0	8.7	8.7
19	2.8	7.1	2.2
20	2.0	2.2	1.4
21	2.2	8.7	2.2
22	3.0	4.8	2.3
23	2.4	0	3.0

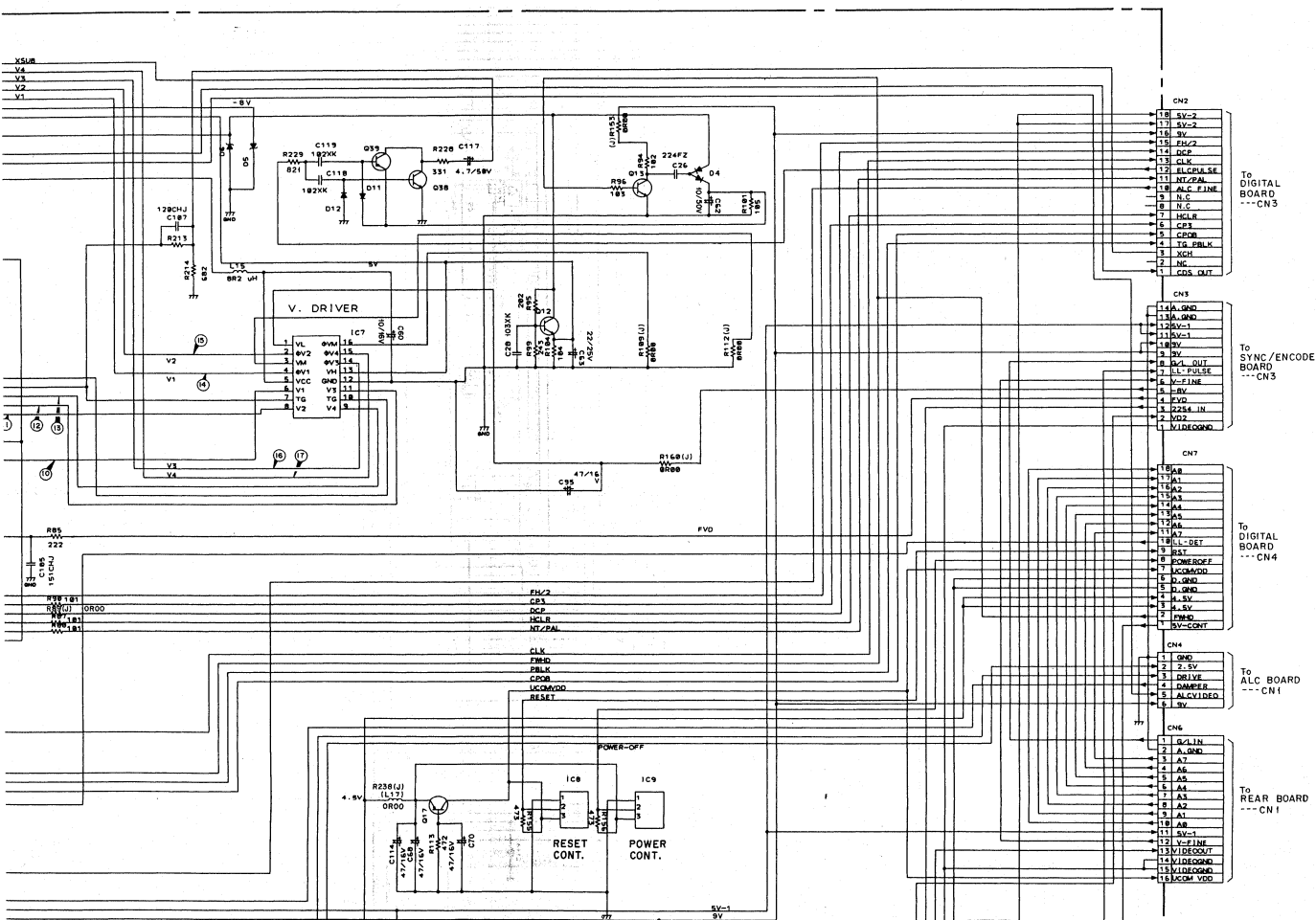
	B	C	E
24	5.4	8.7	4.7
33	6.7	2.2	7.3
34	6.7	2.2	7.3
35	1.6	0	2.2
36	1.6	0	2.2
37	4.9	5.0	5.6
38	0	12.7	0
39	23.4	-	24.0

DRIVE BOARD



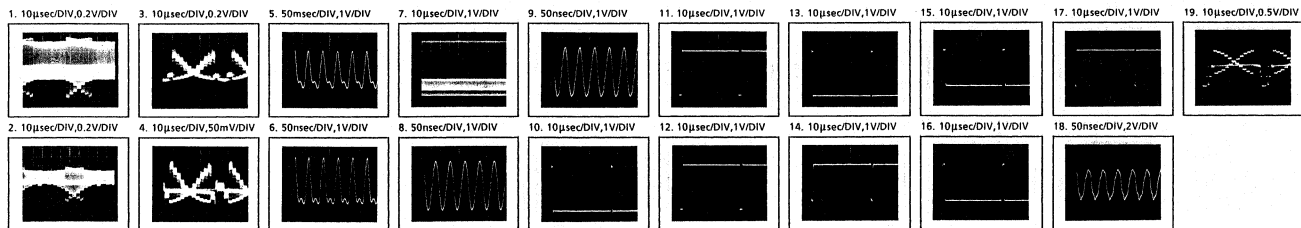
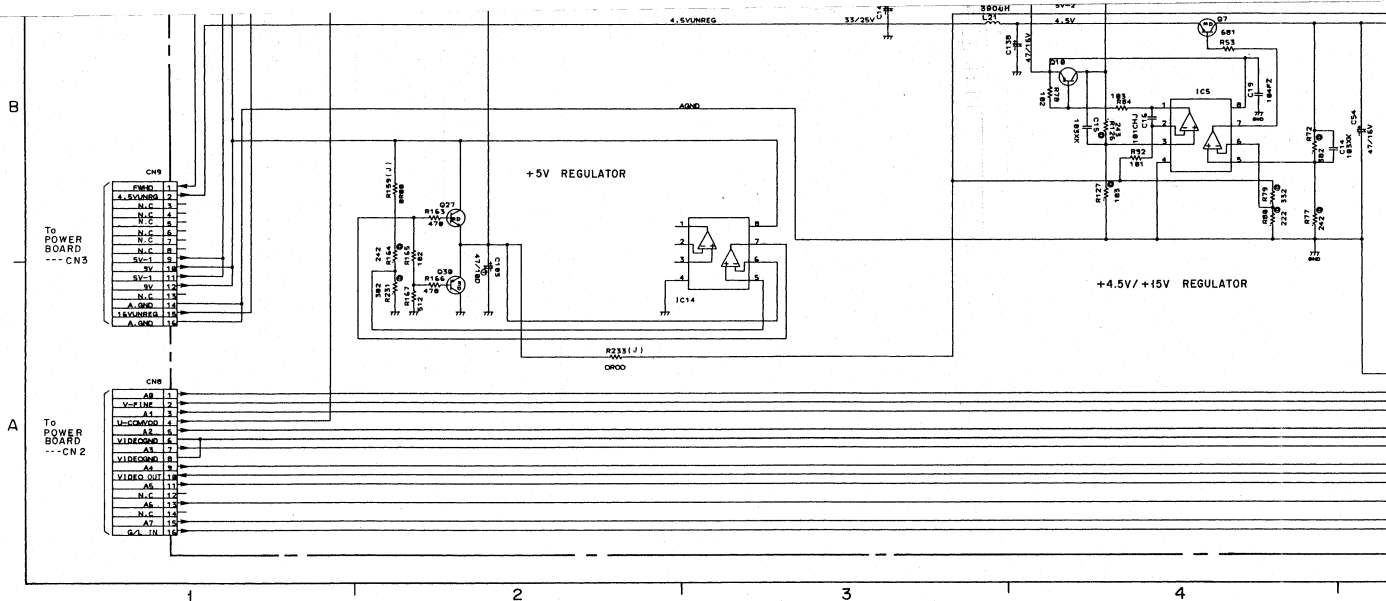


IVE BOARD FOR WV-CL350/WV-CL354

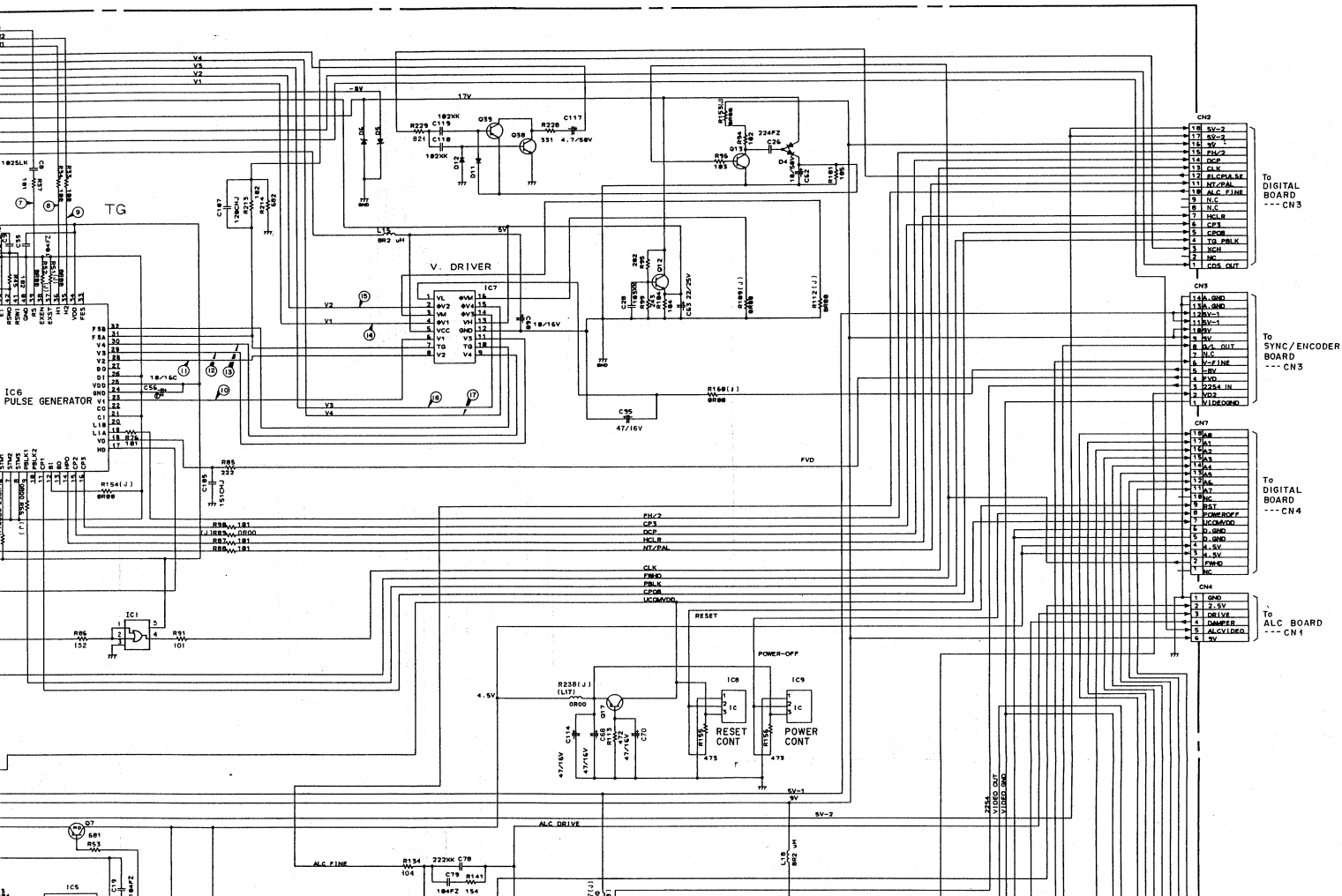


<Index> DRIVE BOARD

IC1	B4
IC2	D2
IC3	C2
IC4	A2
IC5	A3
IC6	C4
IC7	D5
IC8	B6
IC9	B6
IC10	A4
IC20	D3
IC21	B3
IC22	A2
Q1	D1
Q2	D2
Q3	C2
Q4	C2
Q6	B2
Q7	B2
Q8	A1
Q9	A1
Q10	B3
Q12	D6
Q13	D6
Q17	B6
Q18	B7
Q19	A6
Q20	A7
Q21	A7
Q22	A5
Q23	A5
Q24	C2
Q33	A6
Q34	A6
Q35	A6
Q37	A2
Q38	D5
Q39	D5
D1	D3
D2	A7
D4	D6
D5	D5
D6	D5
D7	C3
D8	C3
D11	D5
D12	D5



OF DRIVE BOARD FOR WV-CL352



CONDUCTOR VIEW OF DRIVE

	IC1	IC2	IC3	IC5	IC7	IC8	IC9	IC10	IC14	IC20	IC21
Pin1	2.9	4.8	0	9.4	-7.8	0	0	2.3	0	1.3	1.1
2	2.9	2.6	4.8	4.8	-7.5	4.4	4.5	2.3	0.2	1.3	1.1
3	0.5	2.6	0	4.8	0	4.5	4.5	2.3	0.3	0	0
4	2.9	4.8	4.8	0	-0.2		0	0	0	0.5	0.4
5	5.4	1.2	0	1.9	4.8		2.3	4.8	4.8	4.8	
6		1.2	2.3	1.9	0.1		2.3	4.8			
7	0	0.4	4.2	4.8			4.1	5.0			
8	1.8	0.6	17.4	0			0	8.8			
9	0		0.1								
10	0		4.8								
11		2.0	4.6								
12		2.0	0								
13		0	14.6								
14		0	-7.4								
15		0	00.2								
16		0	0								
17		4.8									
18		4.8									
19		4.8									
20		4.8									

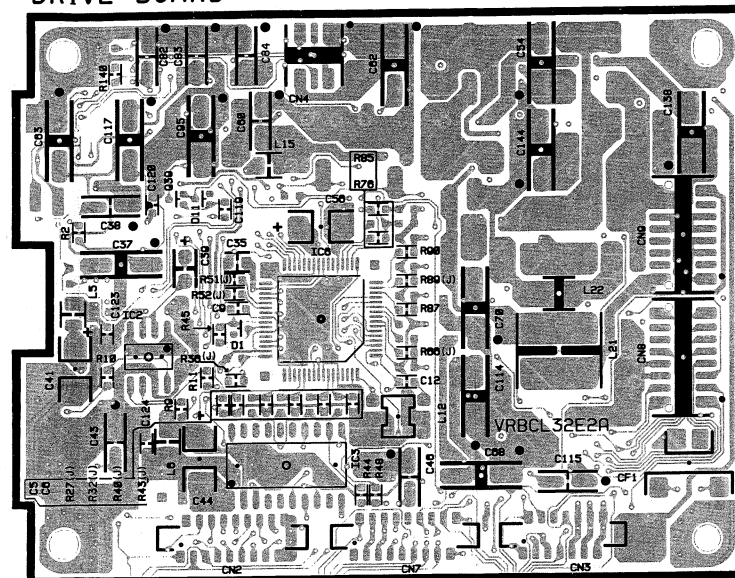
	IC6	IC6
Pin 1	0	Pin 33 4.7
2	2.0	34 4.8
3	0	35 1.8
4	0	36 2.4
5	0	37 0
6	4.8	38 0
7	0	39 1.5
8	0	40 0
9	0	41 1.1
10	0.7	42 8.5
11	0	43 0
12	0	44 0
13	0	45 1.1
14	0.5	46 1.4
15	0.1	47 0
16	0	48 4.8
17	0.4	49 0
18	0.1	50 0
19	2.4	51 0
20	2.4	52 0
21	0	53 0
22	4.8	54 4.8
23	0.1	55 0
24	0	56 0
25	4.8	57 0
26	0	58 0
27	4.8	59 0
28	4.6	60 0
29	4.6	61 0
30	0.1	62 0
31	4.8	63 0
32	4.8	64 0

	B	C	E
Q1	3.0	6.9	2.2
2	8.6	8.7	7.9
3	1.7	8.7	1.4
4	1.7	5.4	1.05
5	6	2.3	2.0
6	2.3	2.0	4.8
7	4.3	4.5	5.0
10	15.2	16.6	14.6
12	15.2	16.6	14.6

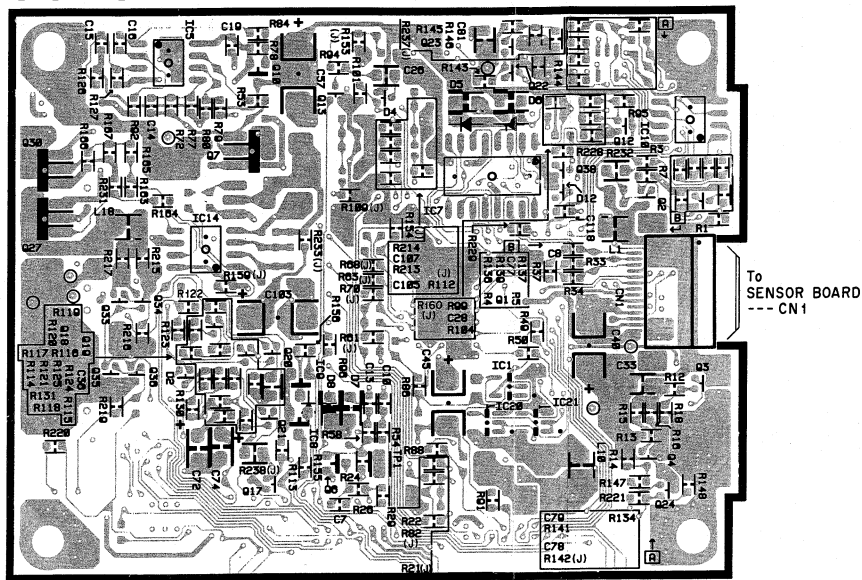
	B	C	E
13	0.1	7.1	0
17	3.6	4.3	4.4
18	8.0	8.7	8.7
19	2.8	7.1	2.2
20	2.0	2.2	1.4
21	2.2	8.7	2.2
22	3.0	4.8	2.3
23	2.4	0	3.0

	B	C	E
24	5.4	8.7	4.7
27	4.8	8.7	5.0
30	4.6	0	5.0
33	6.7	2.2	7.3
34	6.7	2.2	7.3
35	1.6	0	2.2
36	1.6	0	2.2
38	0	12.7	0
39	23.4	-	24.0

DRIVE BOARD



(PATTERN SIDE)

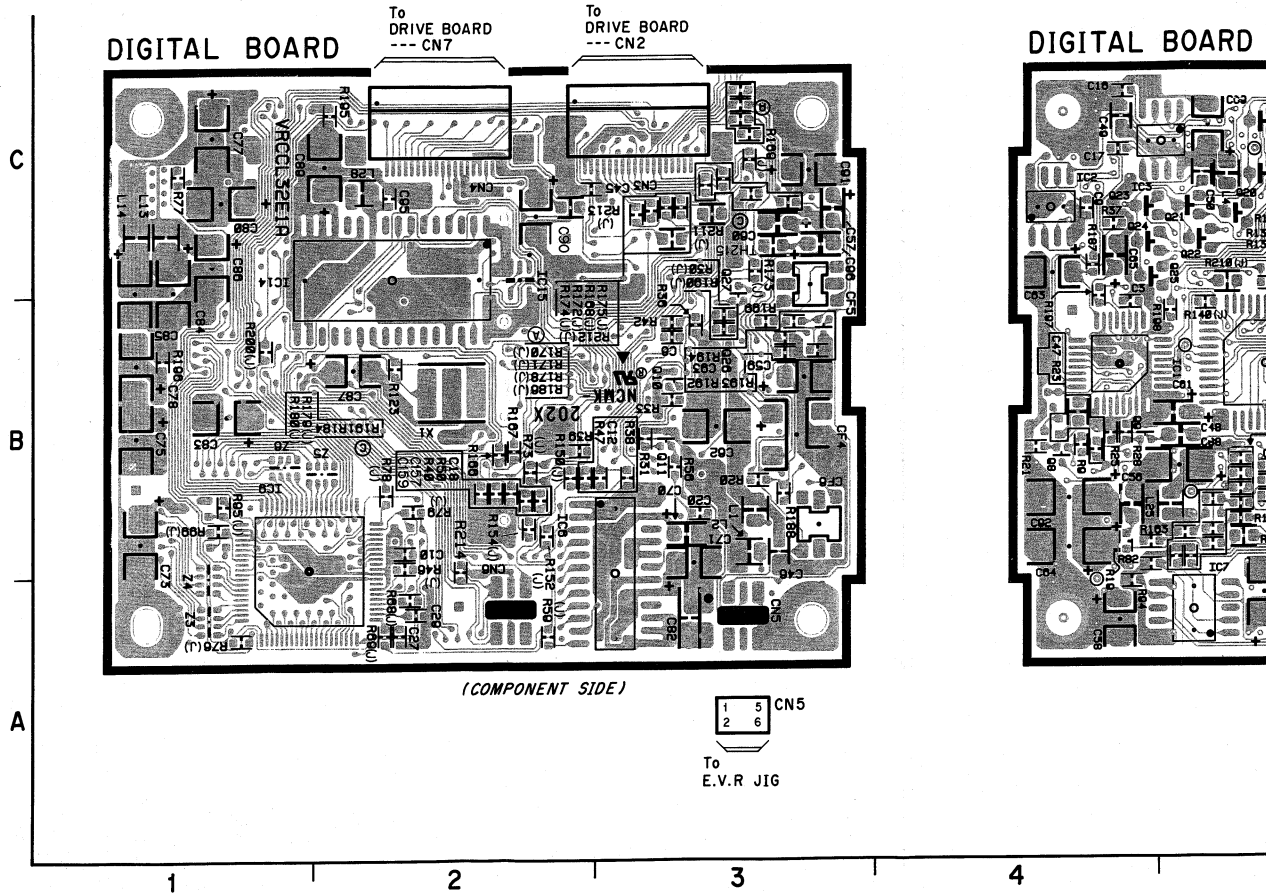


IC1	B5
IC2	B1
IC3	A1,A2
IC5	C4
IC6	B2
IC7	B5
IC8	A4
IC9	B4
IC10	B6
IC14	B4
IC20	A5
IC21	A5
Q1	B5
Q2	B6
Q3	A6
Q4	A5
Q6	A4
Q7	B4
Q10	C4
Q12	B5
Q13	C4
Q17	A4
Q18	B4
Q19	B4
Q20	B4
Q21	A4
Q22	C5
Q23	C6
Q24	B4
Q30	B4
Q33	B5
Q34	B5
Q35	B5
Q38	C6
Q39	C1
D1	B1
D2	B5
D4	C6
D5	C6
D6	C6
D7	B5
D8	B5
D11	B1
D12	B6

<Index>

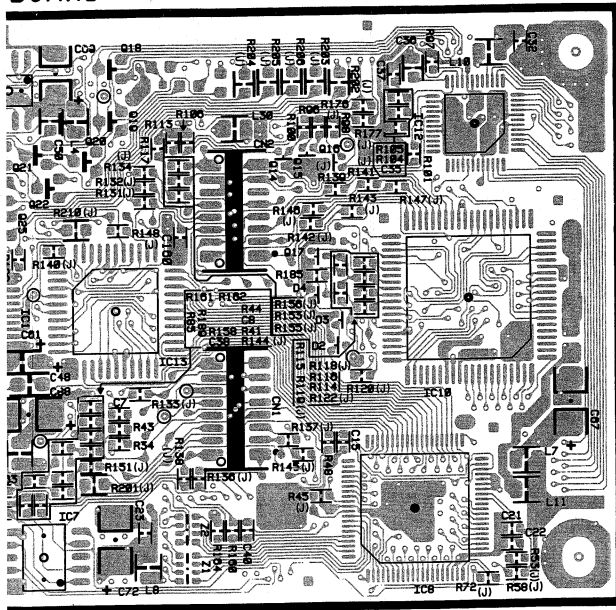
DIGITAL BOARD

IC1	B5
IC2	B4
IC3	C4
IC6	A2
IC7	A5
IC8	A6
IC9	A1
IC10	B6
IC12	B6
IC13	B5
IC14	B1,B2
IC15	B2
Q8	B4
Q9	B5
Q10	B3
Q11	B3
Q14	B5
Q15	B6
Q16	B6
Q17	B6
Q18	C5
Q19	B5
Q20	B5
Q21	B5
Q22	B5
Q24	B5
Q25	B4
Q26	B3
Q27	B3
D2	B6
D3	B6
D4	B6

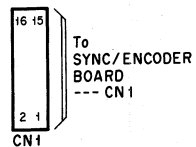
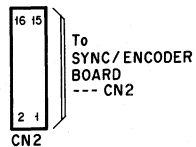


OF DIGITAL BOARD

BOARD



(PATTERN SIDE)



	IC8	IC9	IC10
Pin1	0.3	2.1	2.4
2	0.8	0	2.4
3	2.8	0.1	2.4
4	0.4	1.8	2.4
5	0.9	1.5	2.4
6	0.8	1.5	2.8
7	1.2	0.7	2.7
8	1.5	2.5	3.6
9	1.2	3.4	2.4
10	0.2	0	3.6
11	1.2	0.2	3.1
12	2.1	1.2	3.1
13	1.8	1.4	3.0
14	1.3	1.1	2.8
15	1.4	1.2	0.0
16	1.8	2.1	3.9
17	1.8	2.1	3.9
18	0	3.0	4.1
19	0	0	3.4
20	2.1	0.3	1.1
21	0	0.1	3.1
22	4.3	0.5	3.1
23	0.4	2.1	4.3
24	2.4	0	0.0
25	1.3	0.8	0.1
26	1.5	1.0	4.8
27	1.7	0	2.1
28	1.6	0	4.3
29	1.5	1.7	1.9
30	0.5	0	1.3
31	1.6	0	0.0
32	0.4	0	0.0
33	0	4.3	0
34	0	4.3	0
35	0	4.1	4.3
36	0	4.2	0
37	0	4.2	4.3
38	0	4.2	4.3
39	0	0	4.3
40	0	0	0

	IC8	IC9	IC10
Pin 41	0	0	0
42	3.7	4.2	0
43	3.0	4.0	0
44	3.1	2.8	4.3
45	3.0	2.8	4.3
46	2.7	2.8	4.3
48	0.5	1.6	0
48	0.6	0.6	0
49	0.7	1.0	4.3
50	0.8	1.0	0
51	1.0	0.1	0
52	1.1	0.4	4.3
53	0.9	0.2	4.3
54	1.8	0.4	0
55	2.4	2.7	3.2
56	2.8	2.9	0
57	2.4	3.2	0
58	4.3	3.3	1.6
59	0.1	3.8	1.6
60	0	2.8	2.3
61	0.6	0	1.7
62	0	0	2.7
63	4.2	0	0
64	4.2	0	0
65	4.1	0	0
66	4.1	0	0
67	4.3	4.3	3.7
68	4.2	0.5	4.3
69	4.3	0	4.3
70	0	0	0.5
71	4.3	4.3	0.7
72	0	2.1	0.8
73	1.8	1.2	0.9
74	1.5	1.3	1.0
75	2.2	1.4	1.2
76	1.5	1.5	1.0
77	1.6	1.5	1.8
78	1.8	1.5	0
79	0	0	2.4
80	0	1.4	2.3

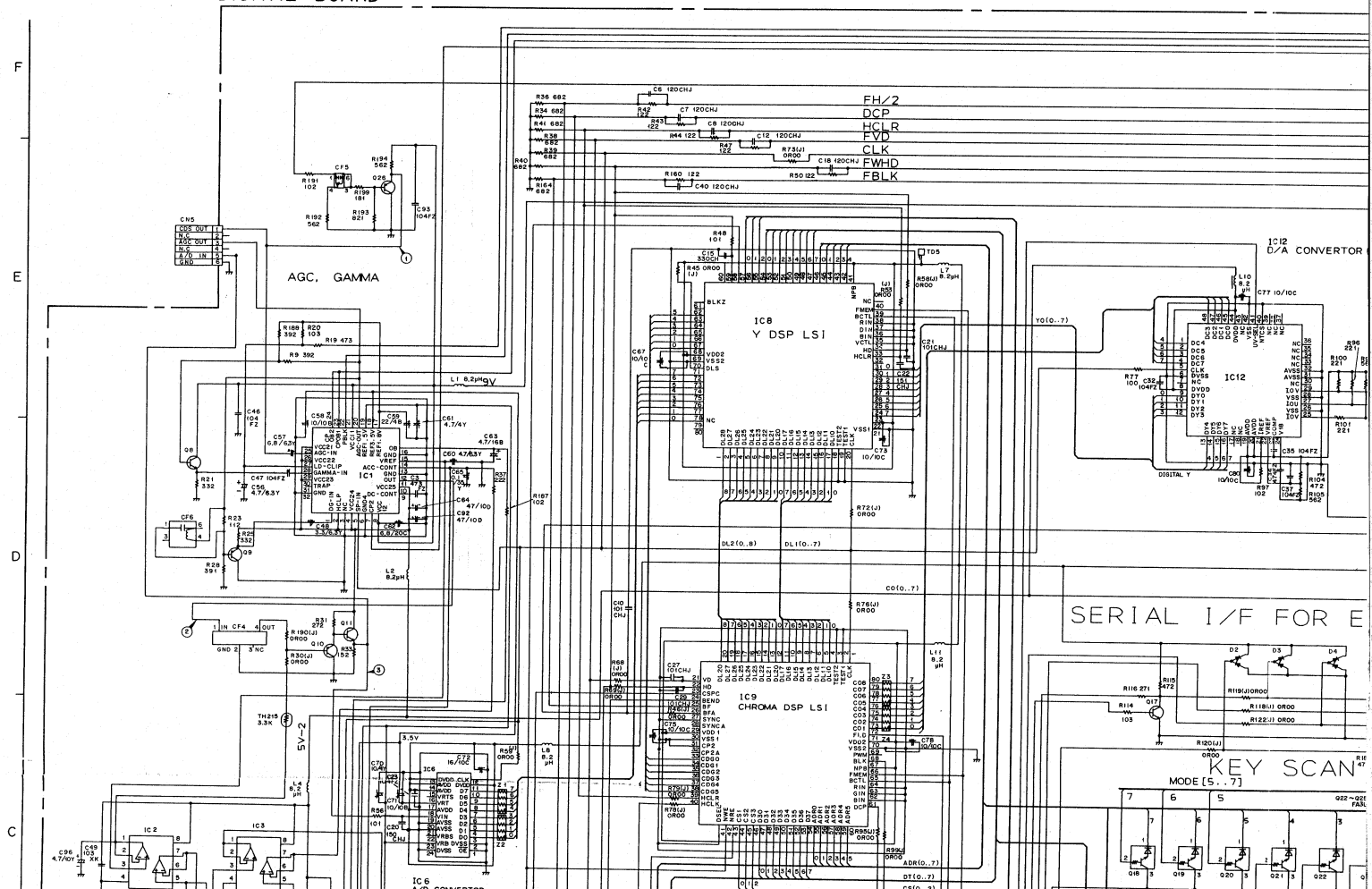
	IC2	IC3	IC7	IC1
Pin 1	1.7	2.2	4.2	0
2	1.7	2.2	0	0.5
3	1.7	2.2	0	0
4	0	0	4.3	2.1
5	1.7	3.1	4.3	4.4
6	1.7	3.1	0	
7	1.7	3.1	0	
8	4.8	4.8	0	
9			4.3	
10			4.3	

	IC1	IC6	IC12	IC14	IC18	IC19	IC21	IC24
Pin	1	9	0	0	0	0	0	0
2	4.8	0	0	0	0	0	4.3	0
3	0	0	0	0	0	0	4.3	0
4	4.8	16	1.4	0	0	0	2.1	0
5	2.1	1.6	2.1	2.1	0	0	0	4.3
6	0	1.7	0	0	0	0	0	4.3
7	0	2.2	0	0	0	0	0	4.3
8	8.7	1.9	68	3.7	0	0	0	0
9	3.1	0	13	0.5	0	0	0	0
10	4.8	0	13	0.1	0	0	0	0
11	2.0	4.3	19.3	4.4	0	0	0	0
12	0	2.1	1.3	0	0	0	0	0
13	2.5	4.3	13	0	0	0	0	0
14	1.7	4.3	0	0	0	0	0	0
15	0	4.3	1.9	0	0	0	0	0
16	1.9	4.3	0	0	0	0	0	0
17	3.7	3.7	0	4.3	0	0	0	0
18	1.6	4.3	0	0	0	0	2.7	0
19	1.9	1.8	6.7	0.8	0	0	0	0
20	0.7	0	0	3.0	0	0	0	0
21	8.9	0	2.7	3.1	0	0	0	0
22	0	0	0	2.6	3.0	0	0	0
23	0	1.6	2.8	2.4	0	0	0	0
24	4.8	0	1.5	2.4	0	0	0	0
25	1.9	3.8	2.4	0	0	0	0	0
26	4.8	0	1.8	0	0	0	0	0
27	1.9	4.2	1.0	4.3	0	0	0	0
28	0	0	1.1	4.3	0	0	0	0
29	0	0	4.2	1.0	0	0	0	0
* 30	4.8	0	0.8	0	0	0	0	0
31	3.1	1.5	0	0.6	4.2	0	0	0
32	0	0	0	0.5	0	0	4.4	0
33	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0
35	0	4.3	0	0	0	0	0	0
36	0	0.5	0	0	0	0	0	0
37	0	0	0.1	0	0	0	0	0
38	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0
40	0	4.3	0	0	0	0	0	0
41	0	4.3	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0
44	4.8	4.3	0	0	0	0	0	0
45	0	0	0	0	0	0	0	0
46	16	0	0	0	0	0	0	0
47	18	0	0	0	0	0	0	0
48	20	0	0	0	0	0	0	0

	B	C	E
QB 1.9	8.7	1.36	
9	0.5	0	1.1
10	1.9	0	2.5
11	2.5	4.8	1.8
14	4.2	4.8	3.6
15	4.5	4.7	3.9
16	4.2	4.8	0
17	0	4.4	0
18	0	4.3	0
19	0	4.3	3.8
20	0	4.3	2.4
21	0	4.3	3.6
22	0	4.3	3.0
23	0	4.3	3.1
24	0	4.3	3.0
25	0	4.3	2.8
26	1.7	0	2.3
27	0	3.1	1.6

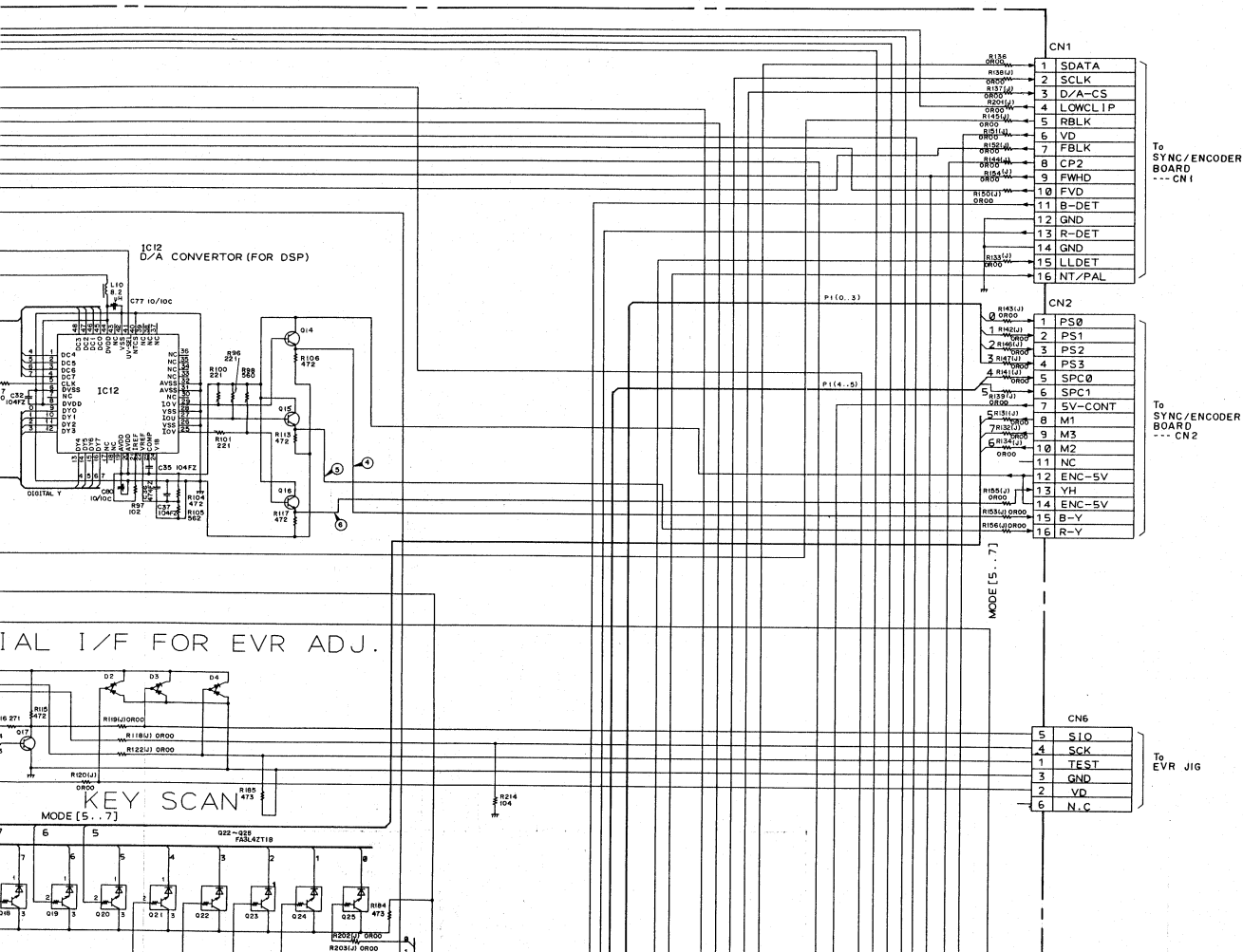
SCHEMATIC DIAGRAM OF DIGITAL BOARD

DIGITAL BOARD





GRAM OF DIGITAL BOARD

<Index>
DIGITAL BOARD

IC1	D2
IC2	C1
IC3	C1
IC6	C2
IC7	B2
IC8	E3
IC9	C3
IC10	B3
IC12	E5
IC13	A5
IC14	A6
IC15	A6
Q8	D1
Q9	D1
Q10	D2
Q11	D2
Q14	E5
Q15	E5
Q16	D5
Q17	C4
Q18	C4
Q19	C3
Q20	C5
Q21	C5
Q22	C5
Q23	C5
Q24	C5
Q25	C6
Q26	E2
Q27	B2
D2	D5
D3	D5
D4	D5

1. $10\mu\text{sec}/\text{DIV}, 0.1\text{V}/\text{DIV}$



2. 10 μ sec/DIV, 0.2V/DIV



3. 10 μ sec/DIV 0.2V/DIV

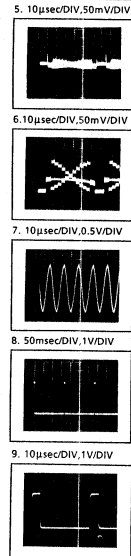
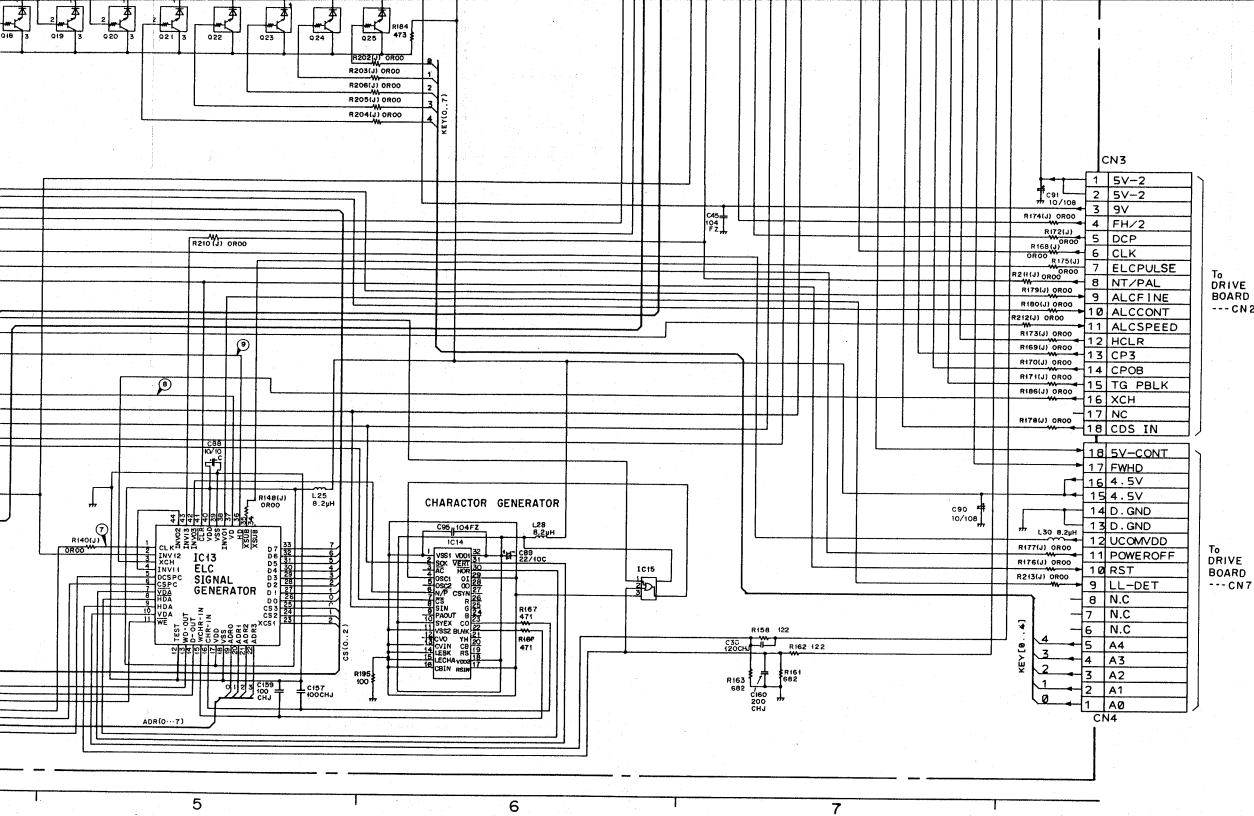


4. 10 μ sec/DIV. 50mV/DIV



5. 10 μ sec/DIV, 50mV/DIV





SCHEMATIC DIAGRAM OF SY

<Index>

SYNC/ENCODER BOARD

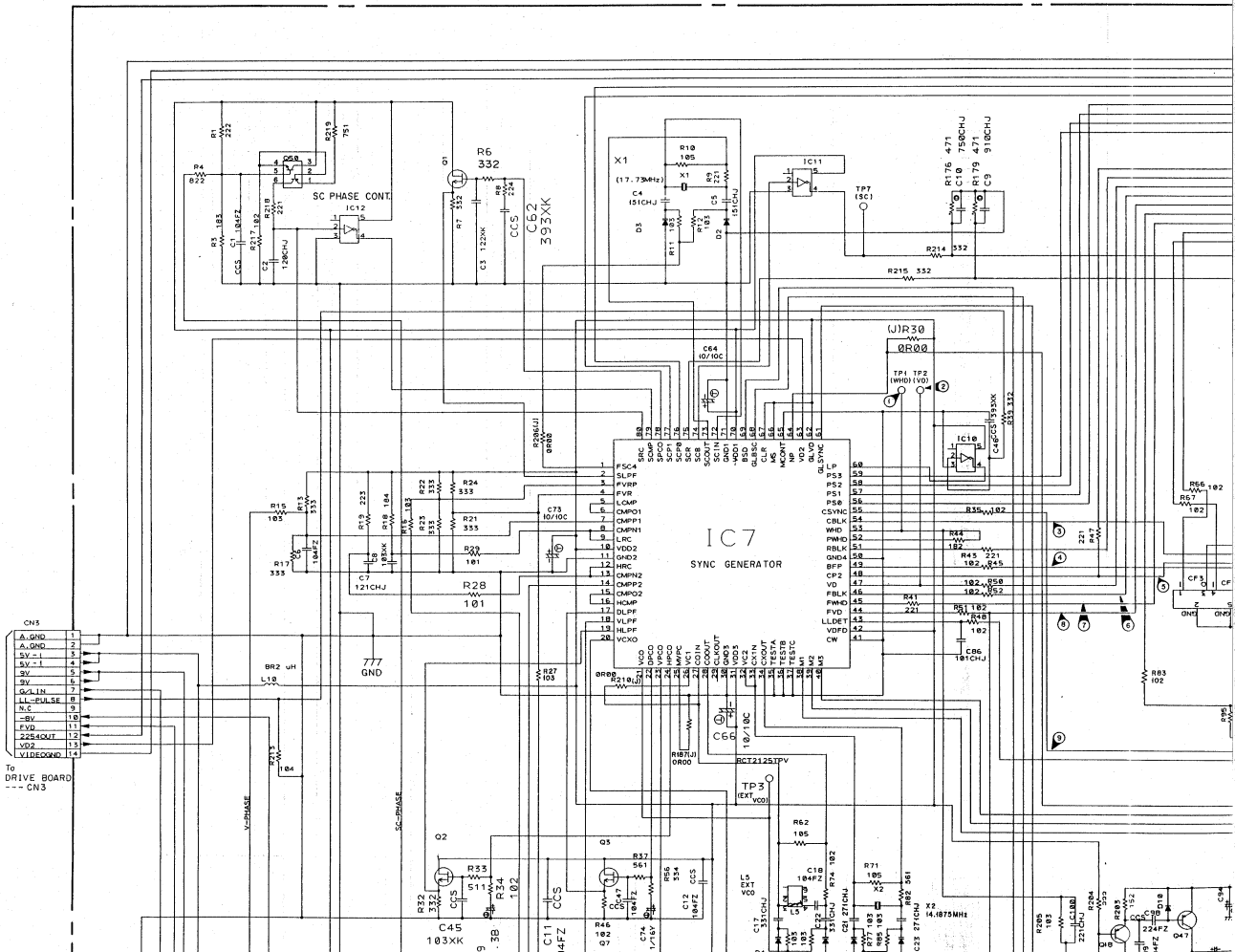
SYNC/ENCODER BOARD

IC4 C5,C6
 IC5 B6
 IC6 A5
 IC7 C3,D3
 IC8 B7
 IC9 B5
 IC10 D4
 IC11 3E
 IC12 2E
 Q1 E2
 Q2 B2
 Q3 B3
 Q7 B3
 Q10 D6
 Q11 C5
 Q12 A3
 Q15 A3
 Q18 A3
 Q19 A4
 Q29 A2
 Q37 A2
 Q38 A2
 Q39 A3
 Q40 A3
 Q41 A4
 Q42 A5
 Q49 B4
 Q48 B4
 D1 B5
 D2 D3
 D3 D3
 D4 B3
 D5 B3
 D6 B4
 D7 B4
 D8 B5
 D9 B5
 D10 B4
 D11 B4

E

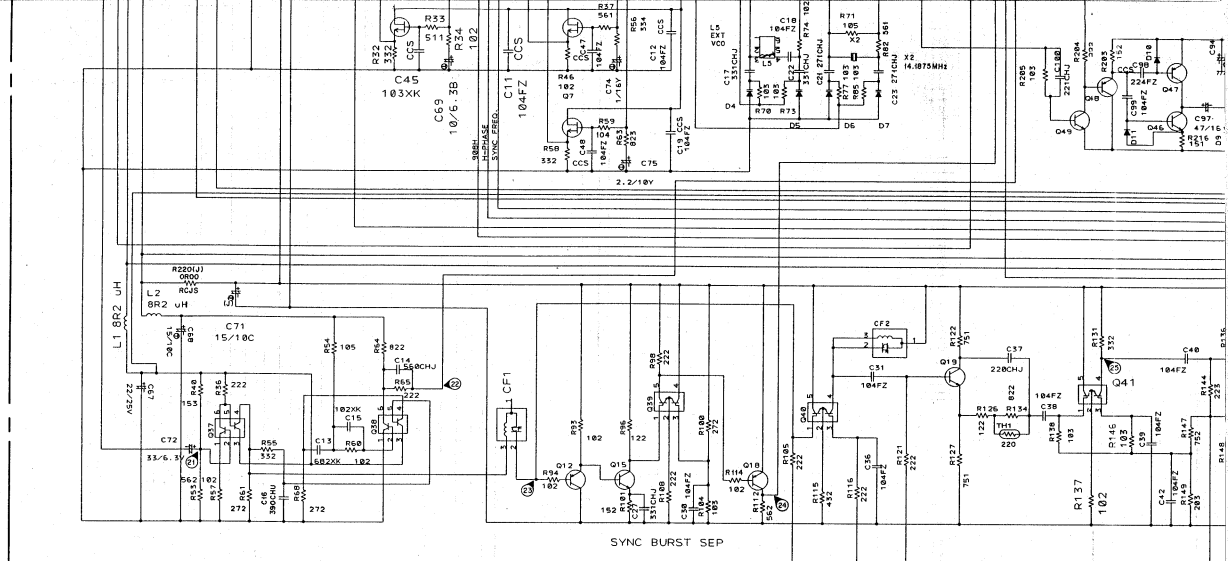
D

C



B

A



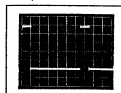
1

2

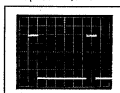
3

4

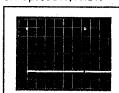
1. 10μsec/DIV, 1V/DIV



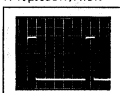
3. 10μsec/DIV, 1V/DIV



5. 10μsec/DIV, 1V/DIV



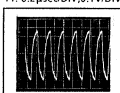
7. 10μsec/DIV, 1V/DIV



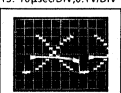
9. 10μsec/DIV, 1V/DIV



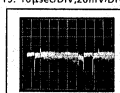
11. 0.2μsec/DIV, 0.1V/DIV



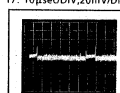
13. 10μsec/DIV, 0.1V/DIV



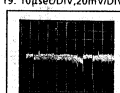
15. 10μsec/DIV, 20mV/DIV



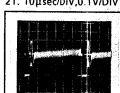
17. 10μsec/DIV, 20mV/DIV



19. 10μsec/DIV, 20mV/DIV



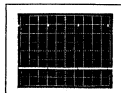
21. 10μsec/DIV, 0.1V/DIV



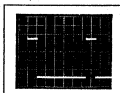
23. 10μsec/DIV



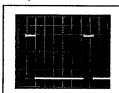
2. 5msec/DIV, 1V/DIV



4. 10μsec/DIV, 1V/DIV



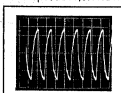
6. 10μsec/DIV, 1V/DIV



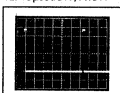
8. 5msec/DIV, 1V/DIV



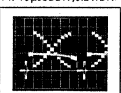
10. 0.2μsec/DIV, 0.1V/DIV



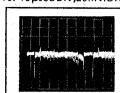
12. 10μsec/DIV, 1V/DIV



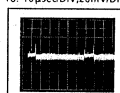
14. 10μsec/DIV, 0.2V/DIV



16. 10μsec/DIV, 20mV/DIV



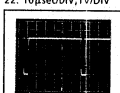
18. 10μsec/DIV, 20mV/DIV



20. 10μsec/DIV, 20mV/DIV



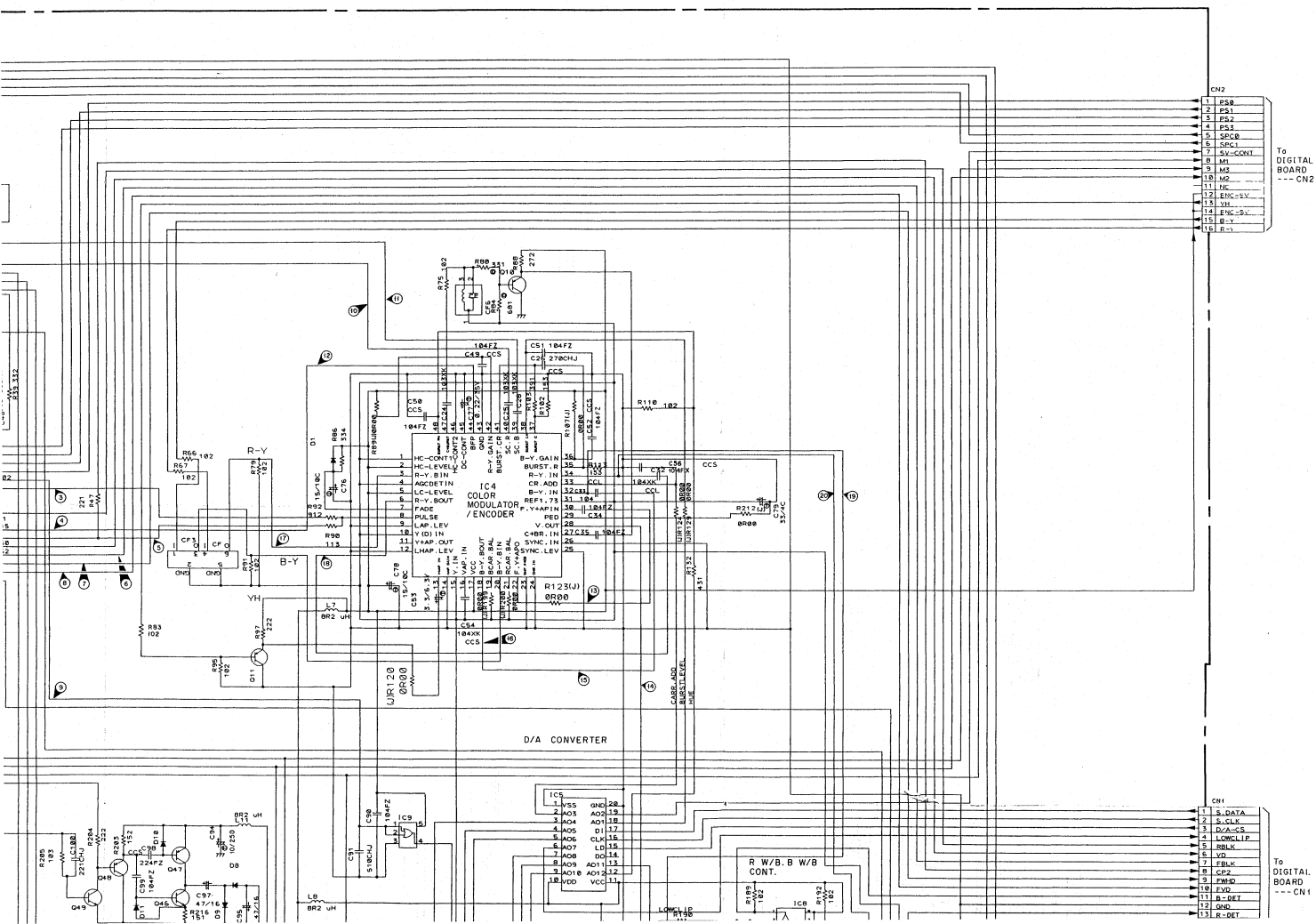
22. 10μsec/DIV, 1V/DIV

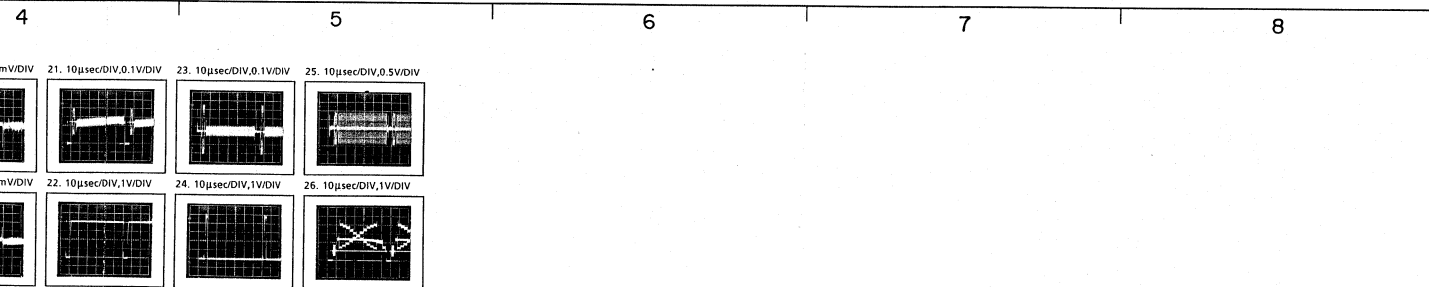


24. 10μsec/DIV



IC DIAGRAM OF SYNC/ENCODER BOARD



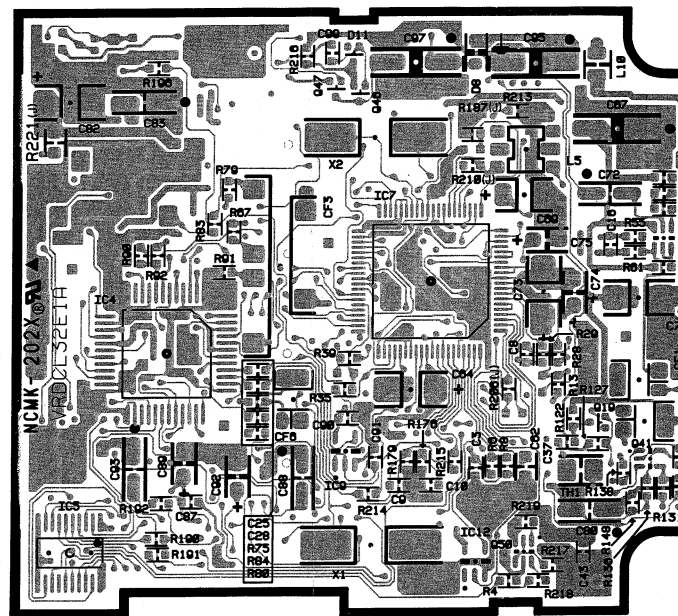


IC4	IC4	IC7	IC7	IC7	IC7	IC1	IC5	IC6	IC8	IC9	IC10	IC11	IC12
Pin1	1.7	Pin25	0	Pin1	0	Pin21	0	Pin41	0	Pin61	0.1	Pin1	0
2	4.8	26	0	2	0.5	22	0	42	4.8	62	4.8	2	0
3	2.6	27	1.7	3	0	-23	0	43	0.1	63	4.7	3	0
4	1.7	28	2.0	4	1.5	24	0	44	0.1	64	0	4	1.0
5	4.8	29	2.1	5	4.8	25	4.8	45	0.7	65	0	5	0
6	0	30	1.2	6	4.8	26	0	46	1.2	66	4.8	6	0
7	4.7	31	1.9	7	0.9	27	0	47	0.1	67	4.8	7	0
8	0	32	1.7	8	0	28	4.8	48	0.1	68	0	8	0
9	0	33	1.7	9	0	29	0	49	0.1	69	4.8	9	0
10	1.7	34	0	10	4.8	30	0	50	0	70	4.8	10	0
11	0	35	2.9	11	0	31	4.8	51	1.0	71	0	11	4.8
12	0	36	4.8	12	0	32	0	52	0.7	72	2.4	12	0
13	0	37	2.9	13	0	33	0	53	0.7	73	2.5	13	0
14	0	38	2.4	14	2.3	34	4.8	54	1.1	74	1.3	14	0
15	1.7	39	1.7	15	4.8	35	0	55	4.4	75	1.3	15	0
16	1.7	40	1.7	16	4.8	36	0	56	4.3	76	0	16	3.3
17	4.8	41	2.9	17	0	37	0	57	4.3	77	4.3	17	4.3
18	3.3	42	4.8	18	0.3	38	0	58	4.3	78	0	18	2.4
19	1.7	43	0	19	4.7	39	0.0	59	4.7	79	4.8	19	0
20	2.6	44	0.35	20	0	40	0	60	4.8	80	0	20	0
21	1.7	45	2.3										
22	0	46	0										
23	0	47	2.4										
24	0	48	1.1										

B	C	E
Q1	0.4	0
2	4.7	4.8
3	5.2	5.5
7	0.3	0
10	1.7	0
11	0	2.5
12	3.0	0
15	2.7	3.2
18	4.8	0
19	2.0	0
25	0	8.7
46	0.8	1.7
47	9.2	1.7
48	4.1	0
49	0	4.1

Pin1	2	3	4	5	6
Q27	1.6	2.3	6.7	4.4	5.1
38	0	0.6	8.7	3.8	4.4
39	3.2	0	0	0	4.8
40	2.0	0	2.0	4.8	4.8
41	1.4	0.8	1.4	3.4	0
42	0	0	0	0	0.7
45	1.1	1.7	6.7	0	3.1

SYNC/ENCODER BOARD

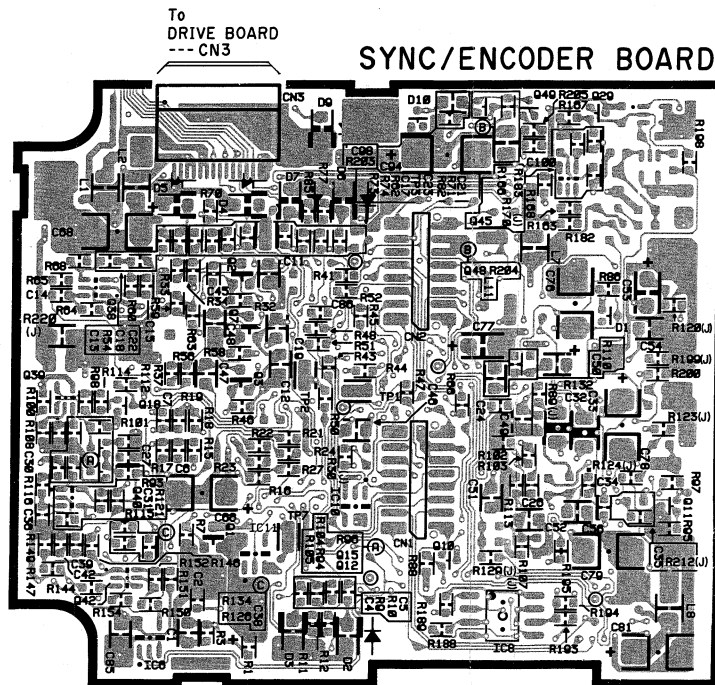


(COMPONENT SIDE)

1

2

3



(PATTERN SIDE)

15	16
1	2

CN2

15	16
1	2

CN 1

IC4 B*

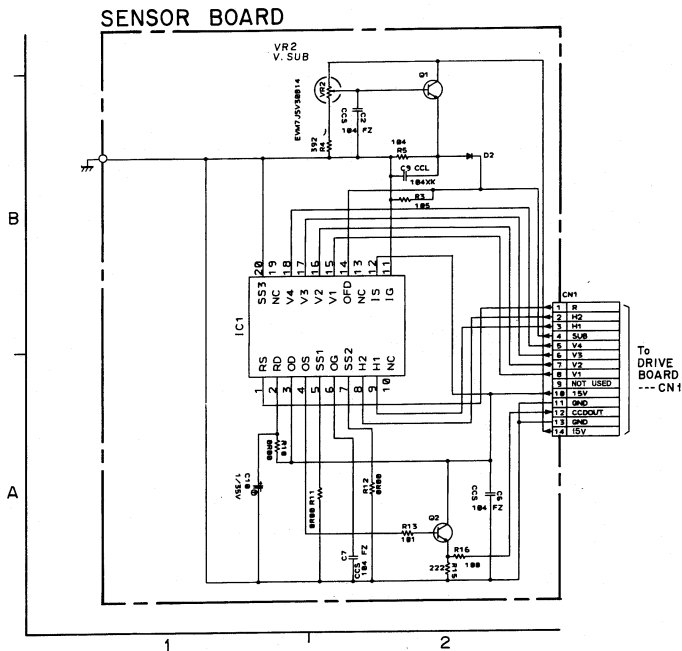
IC4	B1
IC5	A1
IC6	A1
IC7	B2
IC8	A1
IC9	A2
IC10	A2
IC11	A2
IC12	A2
Q1	A4
Q2	B4
Q3	B4
Q7	B4
Q10	A5
Q11	A5
Q12	A5
Q15	A5
Q18	B4
Q19	A3
Q29	C6
Q37	B3
Q38	B4
Q39	B4
Q40	A2
Q41	A3
Q42	A4
Q45	B5
Q46	C2
Q47	C2
Q48	B5
Q49	C5
D1	B6
D2	A5
D3	A5
D4	B4
D5	B4
D6	B5
D7	B5
D8	C2
D9	C5
D10	C5
D11	C2

SCHEMATIC DIAGRAM OF SENSOR BOARD

<Index>

SENSOR BOARD

Q1	B2
Q2	A2
D2	B2



CONDUCTOR VIEW OF SENSOR BOARD

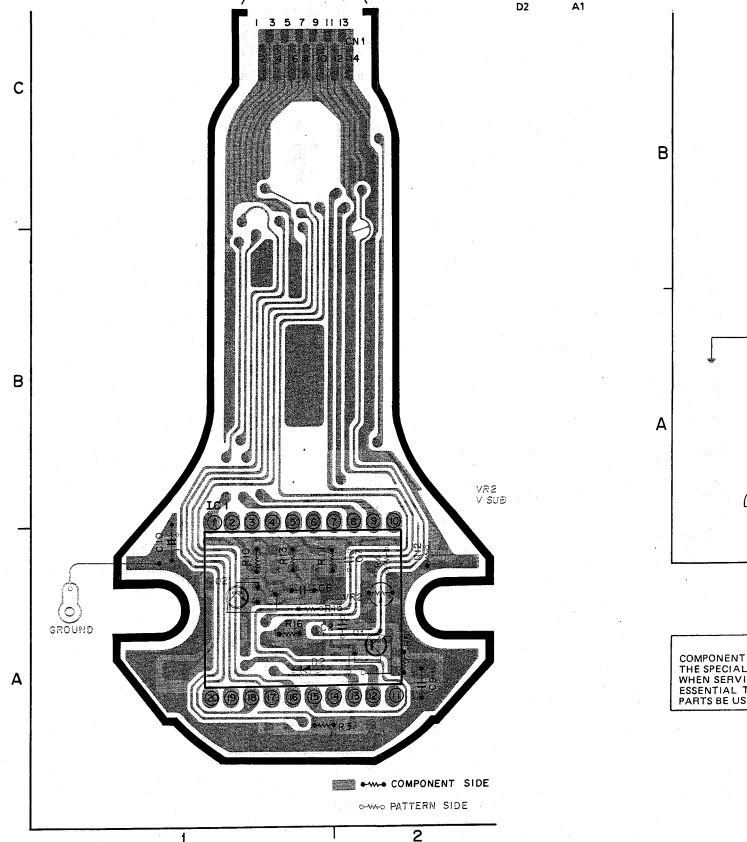
SENSOR BOARD

To DRIVE BOARD
--- CN1

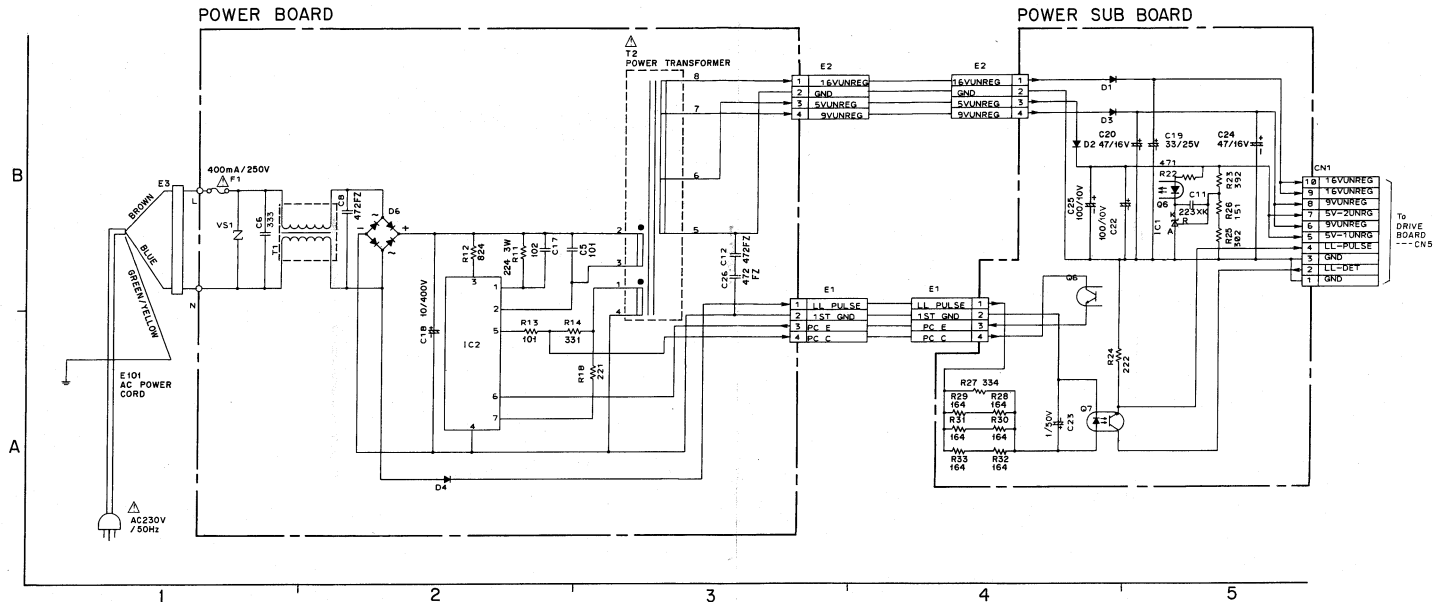
<Index>

SENSOR BOARD

Q1	A2
Q2	A1
D2	A1



SCHEMATIC DIAGRAM OF POWER BOARD FOR WV-CL350



PRODUCT SAFETY NOTICE
COMPONENT IDENTIFIED WITH THE "A" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.

(VOLTAGES) POWER BOARD

	IC1
Pin 1	1.0
2	136.0
3	0.1
4	-0.2
5	-0.2
6	-0.2
7	-0.2

(VOLTAGES) POWER SUB BOARD

	IC1
Pin 1	8.8
2	0
3	2.5

<Index> POWER BOARD

IC2	A2
D4	A2
D6	B2

POWER SUB BOARD

IC1	B5
Q6	B4
Q7	A4
D1	B4
D2	B4
D3	B4

CONDUCTOR VIEW OF POWER BOARD FOR WV-CL350

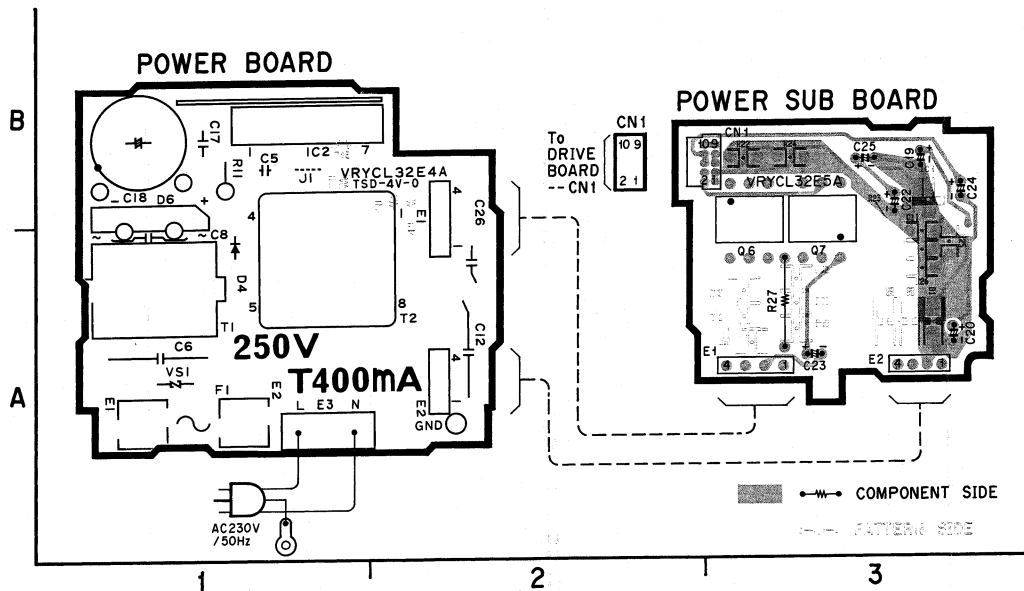
<Index>

POWER BOARD

IC2	B1
D4	A1
D6	A1

POWER SUB BOARD

IC1	B3
Q6	A2,A3
Q7	A3
D1	A3
D2	A3
D3	A3



SCHEMATIC DIAGRAM OF POWER BOARD FOR WV-CL352

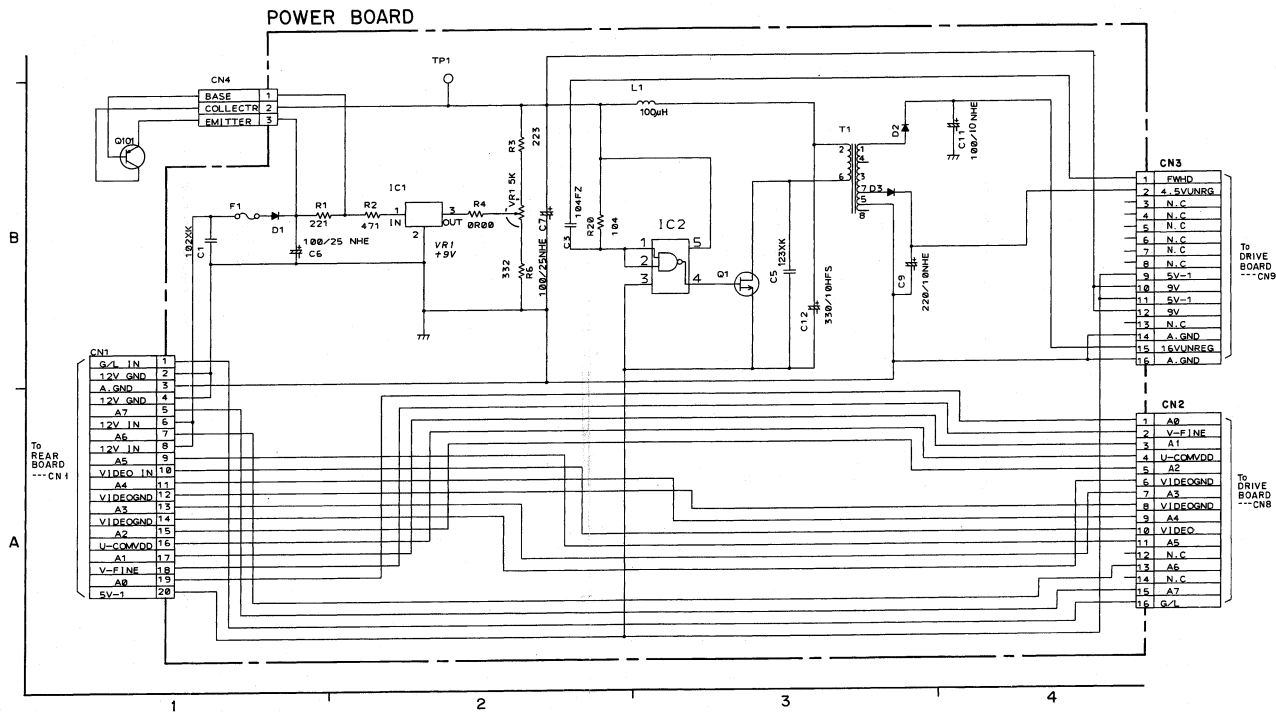
(VOLTAGES)

	IC1	IC2
Pin1	8.2	5.7
2	0	5.7
3	1.2	4.9
4		8.2
5		8.8

	B	C	E
Q1	68.2	8.4	5.9
Q101	10.3	0	11.4

<Index>
POWER BOARD

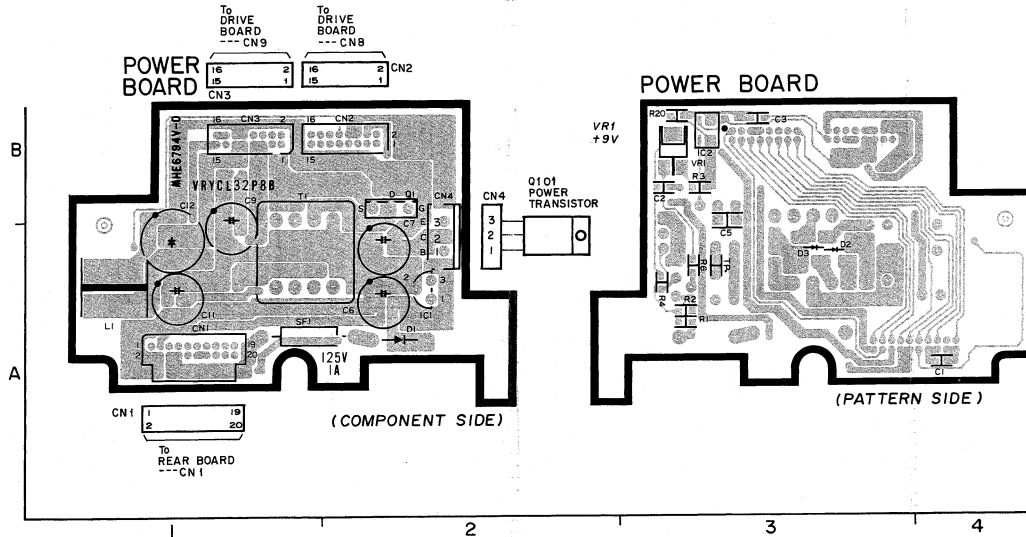
IC1	B2
IC2	B3
Q1	B3
Q101	B1
D1	B1
D2	B3
D3	B3



CONDUCTOR VIEW OF POWER BOARD FOR WV-CL352

<Index> POWER BOARD

IC1	A2
IC2	B3
Q1	B2
Q101	A2
D1	A2
D2	A3
D3	A3

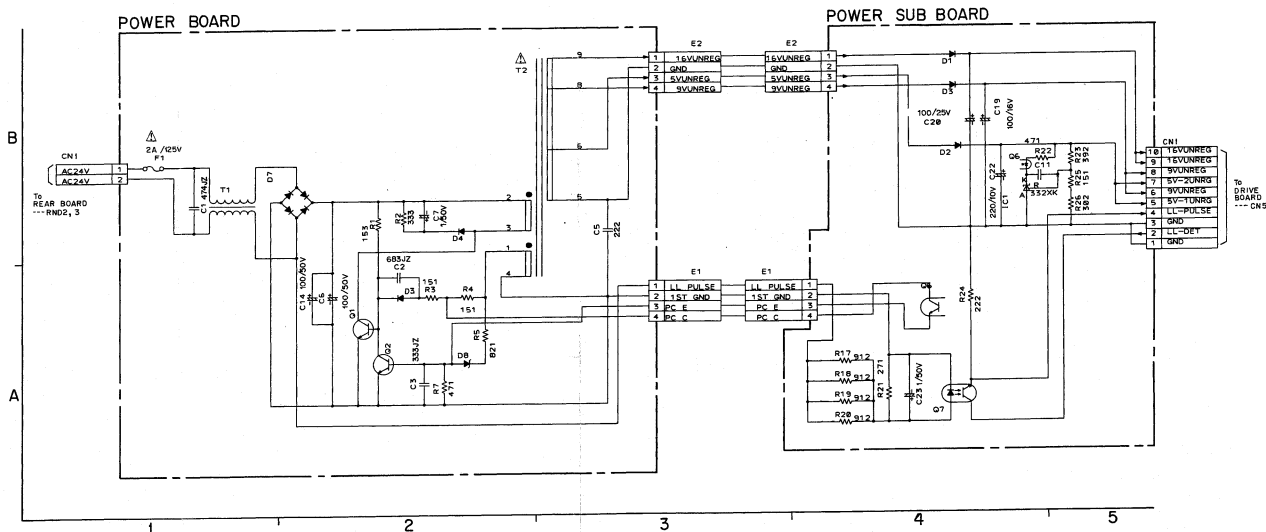


	IC1
Pin 1	8.8
2	0
3	2.5

POWER BOARD

Q1	A2
Q2	A2
D3	A2
D4	B2
D7	B2
D8	A2

IC1	B4
Q6	A4,B4
Q7	A4
D1	B4
D2	B4
D3	B4



PRODUCT SAFETY NOTICE
COMPONENT IDENTIFIED WITH THE "A" MARK HAVE THE SPECIAL CHARACTERISTICS FOR SAFETY. WHEN SERVICING ANY OF THESE COMPONENTS, IT IS ESSENTIAL THAT ONLY MANUFACTURE'S SPECIFIED PARTS BE USED.

<Index>
POWER BOARD

POWER SUB BOARD

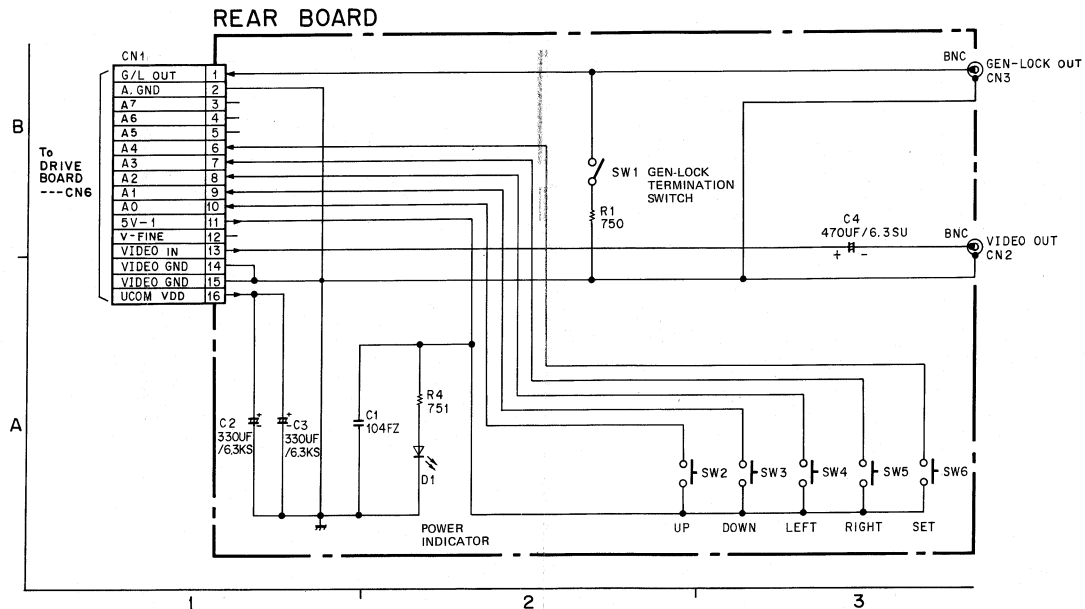
IC1	B3
Q6	A2,A3
Q7	A3
D1	A3
D2	A3
D3	A3



SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL350

<Index>
REAR BOARD

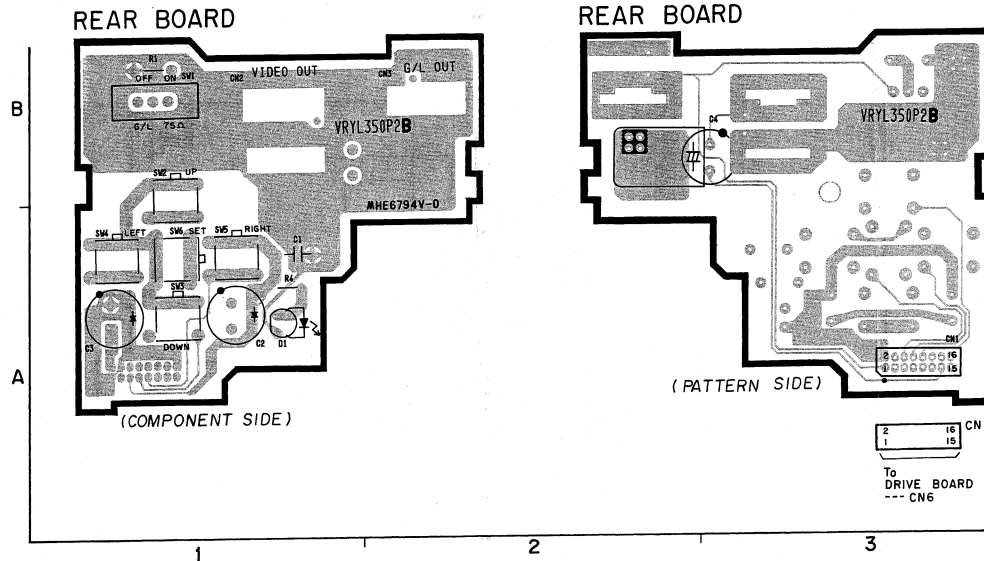
D1 A2



CONDUCTOR VIEW OF REAR BOARD FOR WV-CL350

<Index>
REAR BOARD

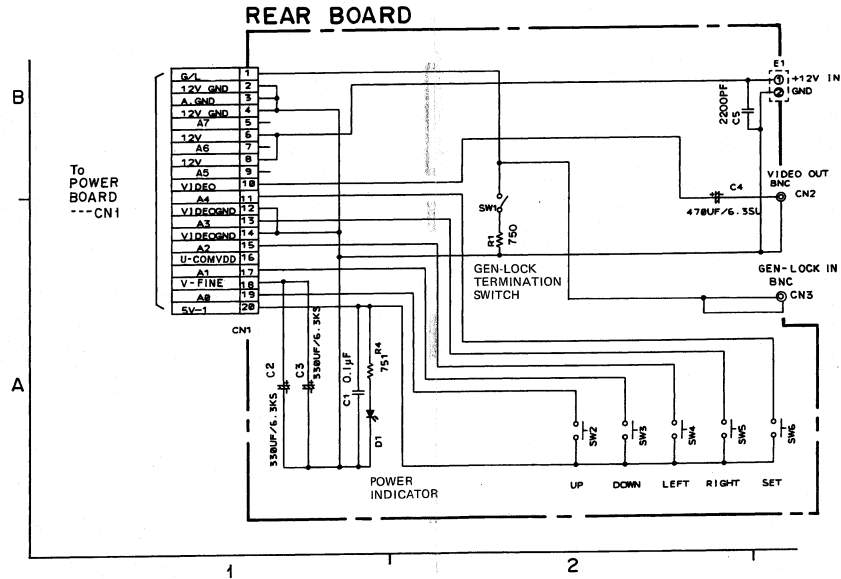
D1 A1



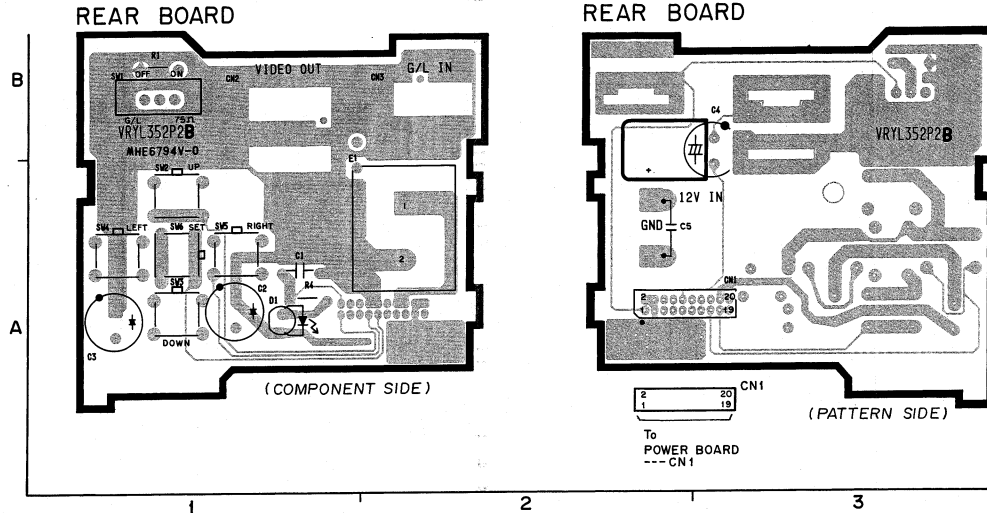
SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL352

<Index>
REAR BOARD

D1 A1



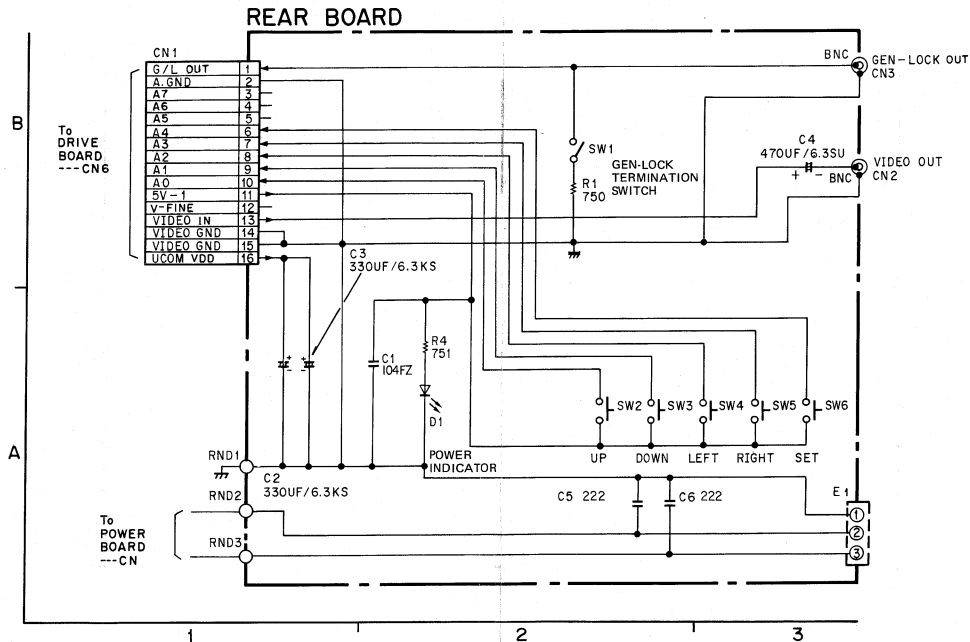
<Index>
REAR BOARD



SCHEMATIC DIAGRAM OF REAR BOARD FOR WV-CL354

<Index>
REAR BOARD

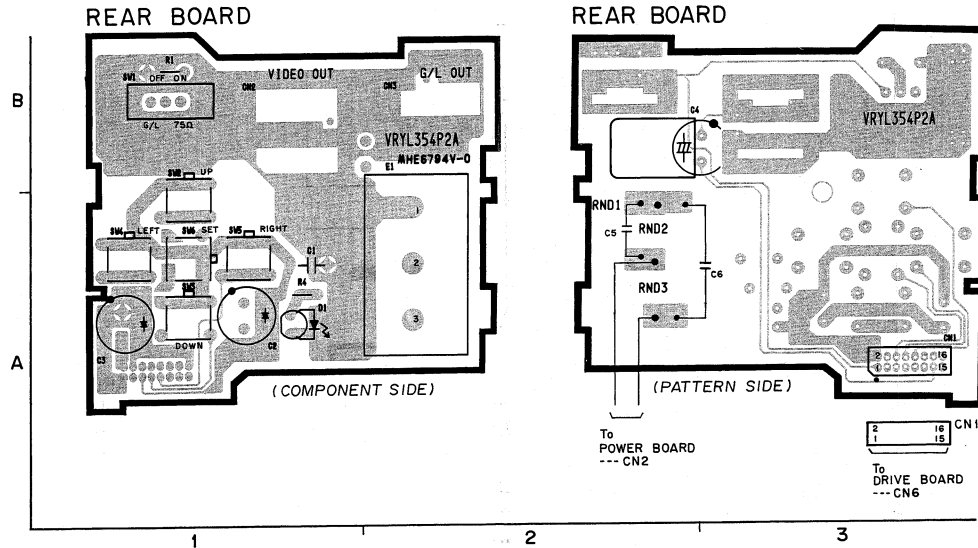
D1 A2



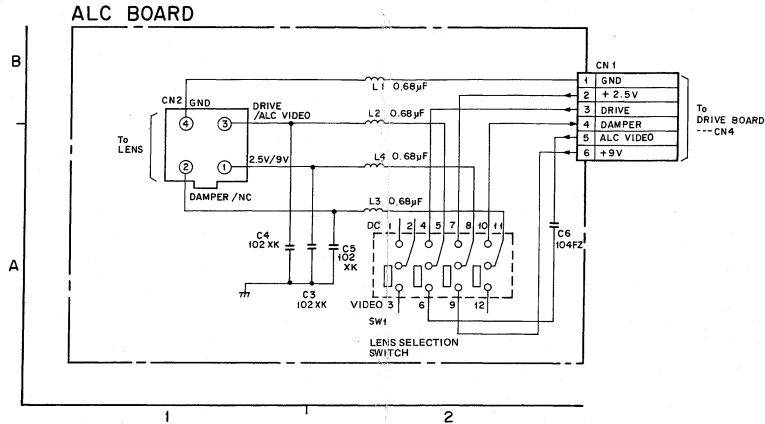
CONDUCTOR VIEW OF REAR BOARD FOR WV-CL354

<Index>
REAR BOARD

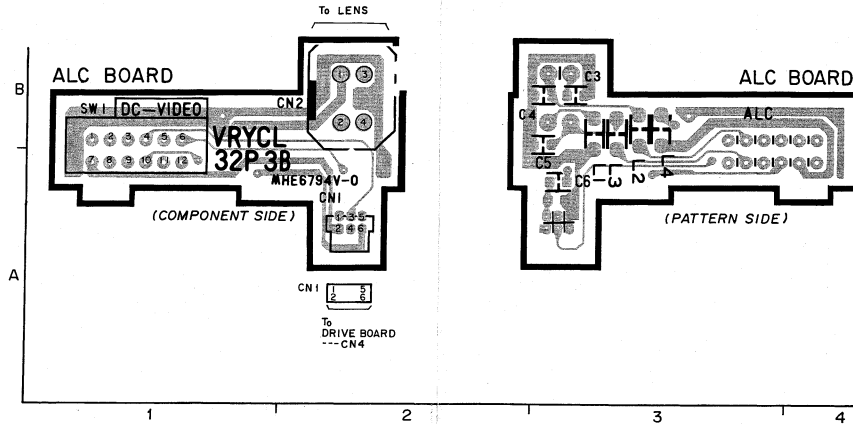
D1 A1

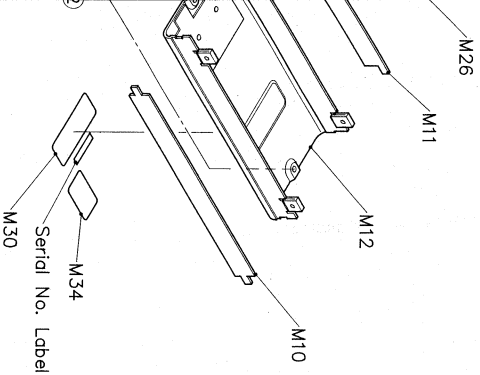


SCHEMATIC DIAGRAM OF ALC BOARD



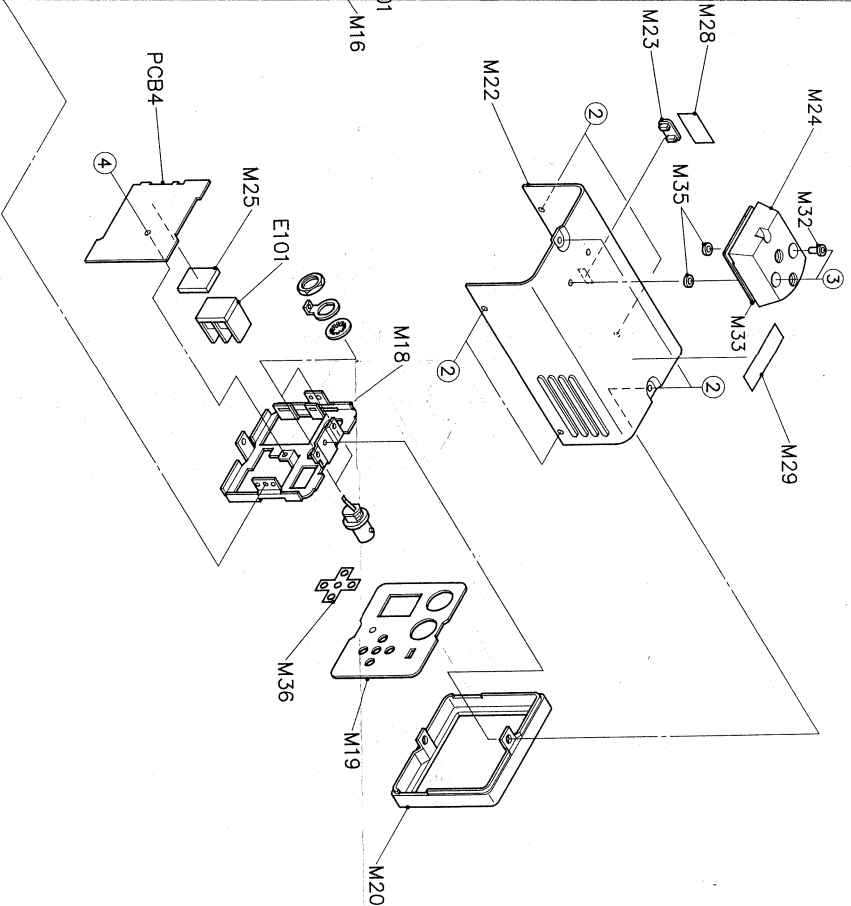
CONDUCTOR VIEW OF ALC BOARD



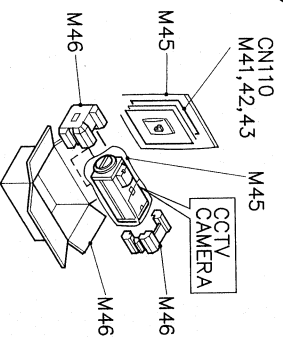


The image contains two exploded view diagrams of camera models WV-CL350 and WV-CL354. The top diagram for WV-CL350 shows components M46 (lens housing), M47 (lens), M44 (mounting bracket), M45 (CCTV camera body), and CN110/M41,42,43 (sensor assembly). The bottom diagram for WV-CL354 shows components M46 (lens housing), M45 (CCTV camera body), and CN110/M41,42,43 (sensor assembly). Both diagrams illustrate the assembly sequence and relative positions of the parts.

EXPLODED VIEW OF WV-CL352



PACKAGING



REPLACEMENT PARTS LIST

Important Notice

- Components identified by "△" mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.
- Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
COLOR CCTV CAMERA WV-CL350			DRIVE BOARD		
MISCELLANEOUS			Printed Circuit Board Assy		
E101 △	YFKPGTSA25	AC Power Cord for WV-CL350/A	PCB1 (NLA)	YVWKBCL35E1A	IC
	YWHB5308A	AC Power Cord for WV-CL350/B	IC1	YWTC7532FR	IC
E110	YFVM030908A	AC Power Cord for WV-CL350/G	IC2	YWCKA1439M	IC
M1	YWCD20YCAP	Insulator Cap	IC3	MN53003LBJ	IC
	YWV5BA0082A2	Front Escutcheon	IC4	NJM3414M	IC
			IC5	NJM2904M	IC
M2	YWVAKA0920AN	Head Optical Assy	IC6	YWMB621488U	IC
M3	YWV2SA1851A1	Main Mounting Angle	IC7	YWUPD16501GS	IC
M4	YWV4JA0262A4	Spring	IC8,9	-MN13821PTW	IC
M5	YWV1EA0127A4	Special Screw	IC10	NJM3414M	IC
M6	YWV1EA0128A4	Special Screw	IC20,21	YWTC7532FR	IC
M7	YWV3FA0101A3	Ring	IC22	YWM5237ML	IC
M8	YWBK-2B	Body Cap	Q1	25C4619	Transistor
M10	YWV5WC1194A4	Right Side Panel	Q2	25C4619	Transistor
M11	YWV5WB1195A4	Left Side Panel	Q3	25C4619	Transistor
M12	YVW5EA0976A2	Bottom Cover	Q4	25C4619	Transistor
M13	YWV2HA0970B2	Shield Parts	Q6	25K853T1	Transistor
M14	YWV5KA1126A2	Case	Q7	Z5B766-RS	Transistor
M15	YWV6EA0142A3	Lid	Q8	Z5D875-QRS	Transistor
M18	YWV2KA0654B2	Rear Chassis	Q9	Z5B766-RS	Transistor
M19	YWV5WA1202A4	Rear Panel	Q10	25A1576	Transistor or
M20	YWV5BA0083A3	Rear Escutcheon			
M21	YWSR6W1	Cord Clamp	Q12	Z5B1218QRS	Transistor
M22	YWV5EA0975A2	Upper Cover	Q13	25C4617	Transistor
M23	YWV5GA0114A4	Cap	Q17	25A1774	Transistor
M24	YWV2TB0240A3	Mounting Bracket	Q18	25A1774	Transistor
M26	Not Supply	Safety Label	Q19	25C4617	Transistor
M27	YWV7SA1197A4	Fuse Label	Q20	25C4617	Transistor
M28	YWV7SA1338A4	Label	Q21	25C4617	Transistor
M30 △	YWV7QA2639A4	Main Label for WV-CL350/A	Q22	25C4617	Transistor
	YWV7QA2633A4	Main Label for WV-CL350/B	Q23	25A1774	Transistor
			Q24	25C4617	Transistor
	YWV7QA2638A4	Main Label for WV-CL350/G	Q33	25A1774	Transistor
M32	YFV2NA0084A4	Insulator Spacer	Q34	25A1774	Transistor
M33	YFV2PA0207A4	Insulator	Q35	25A1774	Transistor
M34	YWV7SA1335A4	Label	Q36	25A1774	Transistor
M35	YVW1KA0128A4	Washer	Q37	Z5B766-RS	Transistor
M36	YWV3AA0129A4	Dust Proof Parts	Q38	25C4617	Transistor
M37	YWV8CG-EM01	Earth Lug	Q39	25A1774	Transistor
M38	YWV2PA0486A4	Insulator Paper	D1	YWDA121	Diode
			D2	YWDA221	Diode
			D4	YWDA221	Diode
			D5	YWDZ11	Diode
			D6	YWDZ220	Diode
			D7,8	MA372	Diode
			D11	YWDA121	Diode

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
D12	YWDA121	Diode	R118	YWR0816P302D	Metal 3K ohms
R1	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W	R119	YWR0816P153D	Metal 15Kohms
R2,3	ERJ3GEYJ911	Carbon 910 ohms 1/16W	R120	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R4	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R121	ERJ3GEYJ100	Carbon 10 ohms 1/16W
R5,7	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	R122	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R9	ERJ3GEYJ391	Carbon 390 ohms 1/16W	R123	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R10	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R124	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R11	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R125	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R12	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R126	YWR0816P243D	Metal 24K ohms
R13	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	R127	YWR0816P103D	Metal 10K ohms
R14	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R130	YWR0816P242D	Metal 2.4K ohms
R15	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R131	YWR0816P153D	Metal 15Kohms
R16	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R134	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R18	ERJ3GEYJ331	Carbon 330 ohms 1/16W	R136	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R22	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R137	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R24	ERJ3GEYJ302	Carbon 3K ohms 1/16W	R139	ERJ3GEYJ152	Carbon 15K ohms 1/16W
R26	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R140	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R29	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W	R141	ERJ3GEYJ154	Carbon 150K ohms 1/16W
R33,34	ERJ3GEYJ100	Carbon 10 ohms 1/16W	R143	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R37	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R144	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R38	YF2116121JT	Carbon 120 ohms 1/16W	R145,146	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R44,45	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R147	ERJ3GEYJ560	Carbon 56 ohms 1/16W
R46	YF2116473GT	Carbon 47K ohms 1/16W	R148	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
R48	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R155,156	ERJ3GEYJ473	Carbon 47K ohms 1/16W
R49	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R213	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
R50	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R214	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
R53	ERJ3GEYJ681	Carbon 680 ohms 1/16W	R215	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R54	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R216	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
R56	YWR0816P123D	Metal 12Kohms	R217	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R57	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R219-221	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R58,60	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R225	ERJ3GEYJ151	Carbon 150 ohms 1/16W
R62	YWR0816P153D	Metal 15Kohms	R228	ERJ3GEYJ331	Carbon 330 ohms 1/16W
R72	YWR0816P302D	Metal 3K ohms	R229	ERJ3GEYJ821	Carbon 820 ohms 1/16W
R76	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R232	YF2116101JT	Carbon 100 ohms 1/10W
R77	YWR0816P242D	Metal 2.4K ohms	R233	YWR0816P392D	Metal 3.9Kohms
R78	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R234	YWR0816P123D	Metal 12Kohms
R79	YWR0816P332D	Metal 3.3K ohms	R235	ERJ3GEYJ221	Carbon 220 ohms 1/16W
R80	YWR0816P222D	Metal 2.2K ohms	R236	YWR0816P823D	Metal 82 Kohms
R84	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C5,6	YW5CH100J5VB	Ceramic 10 pF
R85	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C7	YW5X103K2VB	Ceramic 0.01 μ F
R86	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	C8	YW55L102K5VB	Ceramic 1000 pF
R87,88	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C9	YW5CH101J5VB	Ceramic 100 pF
R90-92	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C10	YW5CH331J5VB	Ceramic 330 pF
R94	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C12	YW5F104Z2VB	Ceramic 0.1 μ F
R95	ERJ3GEYJ202	Carbon 2K ohms 1/16W	C13	YW5CH331J5VB	Ceramic 330 pF
R96	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C14,15	YW5X103K2VB	Ceramic 0.01 μ F
R99	ERJ3GEYJ243	Carbon 24K ohms 1/16WF	C16	YW5CH101J5VB	Ceramic 100 pF
R101	ERJ3GEYJ105	Carbon 1M ohms 1/16W	C19	YW5F104Z2VB	Ceramic 0.1 μ F
R104	ERJ3GEYJ104	Carbon 100K ohms 1/16W	C26	YF400214ZT	Ceramic 0.22 μ F
R113	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	C28	YW5X103K2VB	Ceramic 0.01 μ F
R114	ERJ3GEYJ620	Carbon 62 ohms 1/16W	C33	YF400104FZT	Ceramic 0.1 μ F
R115	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C35,36	YF400104FZT	Ceramic 0.1 μ F
R116	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C37	ECEV1CV470	Electrolytic 47 μ F 16V
R117	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C38	ECEV1CV100	Electrolytic 10 μ F 16V

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
C39	ECST1VY104ZR	Tantalum 0.1 μ F 35V	J32	ERJ3GEY0R00	Jumper Resistor
C40	ECST1DC106	Tantalum 10 μ F 20V	J36	ERJ3GEY0R00	Jumper Resistor
C41	ECST1CC106ZR	Tantalum 10 μ F 16V	J40	ERJ3GEY0R00	Jumper Resistor
C43	ECEV1CV100	Electrolytic 10 μ F 16V	J43	ERJ3GEY0R00	Jumper Resistor
C44,45	ECST1CC106ZR	Tantalum 10 μ F 16V	J51,52	ERJ3GEY0R00	Jumper Resistor
C46	ECEV1HV2R25R	Electrolytic 2.2 μ F 50V	J55	ERJ3GEY0R00	Jumper Resistor
C47	ECEV1CV470	Electrolytic 47 μ F 10V	J61	ERJ3GEY0R00	Jumper Resistor
C48	ECEV1EV220	Electrolytic 22 μ F 25V	J63	ERJ3GEY0R00	Jumper Resistor
C49,50	ECEV1CV470	Electrolytic 47 μ F 10V	J66	ERJ3GEY0R00	Jumper Resistor
C51	ECEV1CV100	Electrolytic 10 μ F 16V	J68	ERJ3GEY0R00	Jumper Resistor
C52	ECEV1CV470	Electrolytic 47 μ F 10V	J70	ERJ3GEY0R00	Jumper Resistor
C53	ECST1AD476ZR	Tantalum 47 μ F 10V	J82	ERJ3GEY0R00	Jumper Resistor
C54	ECEV1CV470	Electrolytic 47 μ F 10V	J89	ERJ3GEY0R00	Jumper Resistor
C56	ECST1CC106ZR	Tantalum 10 μ F 16V	J109	ERJ3GEY0R00	Jumper Resistor
C60	ECEV1CV100	Electrolytic 10 μ F 16V	J112	ERJ3GEY0R00	Jumper Resistor
C62	ECEV1HV100SP	Electrolytic 10 μ F 50V	J133	ERJ3GEY0R00	Jumper Resistor
C63	ECEV1EV220	Electrolytic 22 μ F 25V	J142	ERJ3GEY0R00	Jumper Resistor
C68,70	ECEV1CV470	Electrolytic 47 μ F 16V	J153,154	ERJ3GEY0R00	Jumper Resistor
C72	ECST0GX106ZL	Tantalum 10 μ F 4V	J160	ERJ3GEY0R00	Jumper Resistor
C74	ECST1CY105ZR	Tantalum 1 μ F 16V	J237,238	YFZ1160R00T	Jumper Resistor
C77	YW5F4732ZVB	Ceramic 0.047 μ F	TP1,4	YWRCT2125TPV	Test Point
C78	YW5X222K5VB	Ceramic 2200 pF			
C79	YW5F104Z2VB	Ceramic 0.1 μ F			
C81	YW5F104Z2VB	Ceramic 0.1 μ F			
C82,83	ECEV1CV100	Electrolytic 10 μ F 16V			
C95	ECEV1CV470	Electrolytic 47 μ F 16V			
C105	YW5CH151J5VB	Ceramic 150 pF			
C107	YW5CH120J5VB	Ceramic 12 pF			
C108	ECEV1CV470	Electrolytic 47 μ F 16V			
C109	ECEV1EV220	Electrolytic 22 μ F 25V			
C110-114	ECEV1CV470	Electrolytic 47 μ F 16V			
C115	ECEV1CV100	Electrolytic 10 μ F 16V			
C117	ECEV1HV4R75P	Electrolytic 4.7 μ F 50V			
C118-120	YW5X102K5VB	Ceramic 1000 pF			
C123,124	YW5X102K5VB	Ceramic 1000 pF			
C125	YW5F104Z2VB	Ceramic 0.1 μ F			
L1	ELJFCBR2MF	Coil 8.2 μ H			
L5	ELJFCBR2MF	Coil 8.2 μ H			
L6	ELJFCBR2MF	Coil 8.2 μ H			
L7	YWN132T221K	Coil 220 μ H			
L8,9	YWCD75101KC	Coil 100 μ H			
L10	ELJFCBR2MF	Coil 8.2 μ H			
L12	EIC4EJ004E	Coil			
L13	YWCD75101KC	Coil 100 μ H			
L15,18	ELJFCBR2MF	Coil 8.2 μ H			
CF1	ELB48532	Filter			
CN1	YW523961490	14-pin Connector			
CN2	YW522051890	18-pin Connector			
CN3	YW522051490	14-pin Connector			
CN4	YW31756356	6-pin Connector			
CN5	YW41756350	10-pin Connector			
CN6	YW41756316	16-pin Connector			
CN7	YW522051890	18-pin Connector			
J21	ERJ3GEY0R00	Jumper Resistor			
J27,28	ERJ3GEY0R00	Jumper Resistor			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
DIGITAL BOARD					
PCB2 (NLA)	YWVKCL35E1A	Printed Circuit Board Assy	R117	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
IC1	AN2015FAP	IC	R123	ERJ3GEYJ105	Carbon 1M ohms 1/16W
IC2,3	NJM4558M	IC	R158,160	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
IC6	YWCXD1175AM	IC	R161	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
IC7	YWM6M80021FP	IC	R162	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
IC8	MN6730FHP	IC	R163,164	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
IC9	MN6731FHP	IC	R166,167	ERJ3GEYJ471	Carbon 470 ohms 1/16W
IC10	MN188166CCV2	IC	R184,185	ERJ3GEYJ473	Carbon 47K ohms 1/16W
IC12	MN65701FHP	IC	R187	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC13	MN53020LB01	IC	R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
IC14	M505542S4FP	IC	R189	ERJ3GEYJ103	Carbon 10K ohms 1/16W
IC15	YWTC7532FR	IC	R191	ERJ3GEYJ102	Carbon 1K ohms 1/16W
Q8	25D2216	Transistor	R192	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
Q9,10	25B1462	Transistor	R193	ERJ3GEYJ821	Carbon 820 ohms 1/16W
Q11	25D2216	Transistor	R194	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
Q14-17	25D2216	Transistor	R195	ERJ3GEYJ100	Carbon 10 ohms 1/16W
Q18-25	FA3142T18	Transistor	R196	ERJ3GEYJ2R2	Carbon 2.2 ohms 1/16W
Q26	25B1462	Transistor	R197	ERJ3GEYJ221	Carbon 220 ohms 1/16W
Q27	25D2216	Transistor	R198	ERJ3GEYJ103	Carbon 10K ohms 1/16W
D2-4	MA131	Diode	R199	ERJ3GEYJ181	Carbon 180 ohms 1/16W
TH215	L311F431J502	Thermistor	R214	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R9	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W	Z1-6	EXBVB470J	Block Resistor
R19	ERJ3GEYJ473	Carbon 47K ohms 1/16W	C3	YW5F4732ZVB	Ceramic 0.047 μ F
R20	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C6-8	YW5CH120J5VB	Ceramic 12 pF
R21	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C9	YW5CH151J5VB	Ceramic 150 pF
R23	ERJ3GEYJ112	Carbon 1.1K ohms 1/16W	C10	YW5CH101J5VB	Ceramic 100 pF
R25	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C12	YW5CH120J5VB	Ceramic 12 pF
R28,30	ERJ3GEYJ391	Carbon 390 ohms 1/16W	C15	YW5CH330J5VB	Ceramic 33 pF
R31	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	C16	YW5CH151J5VB	Ceramic 150 pF
R33	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	C17	YW5X102K5VB	Ceramic 1000 pF
R34,36	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W	C18	YW5CH120J5VB	Ceramic 12 pF
R37	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C20	YW5CH150J5VB	Ceramic 15 pF
R38-41	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W	C21	YW5CH101J5VB	Ceramic 100 pF
R42-44	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W	C22	YW5CH151J5VB	Ceramic 150 pF
R47	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W	C23	YW5F104Z2VB	Ceramic 0.1 μ F
R48	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C27,29	YW5CH101J5VB	Ceramic 100 pF
R50	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W	C32,35	YW5F104Z2VB	Ceramic 0.1 μ F
R56	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C36	YW400474FZ	Ceramic 0.47 μ F
R77	ERJ3GEYJ100	Carbon 10 ohms 1/16W	C37	YW5F104Z2VB	Ceramic 0.1 μ F
R82,85	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	C38	YW5CH120J5VB	Ceramic 12 pF
R94	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	C40	YW5CH120J5VB	Ceramic 12 pF
R96	YWR0816P221D	Metal 220 ohms	C45	YW5F104Z2VB	Ceramic 0.1 μ F
R97	YWR0816P102D	Metal 1K ohms	C46,47	YF400104FZT	Ceramic 0.1 μ F
R98	YWR0816Q560D	Metal 56 ohms	C48	ECST0JY335	Tantalum 3.3 μ F 6.3V
R100,101	YWR0816P221D	Metal 220 ohms	C49,50	YF400103XKT	Ceramic 0.01 μ F
R104	YWR0816P472D	Metal 4.7K ohms	C56	ECST0JY475	Tantalum 4.7 μ F 6.3V
R105	YWR0816P562D	Metal 5.6K ohms	C57	ECST0JY685	Tantalum 6.8 μ F 6.3V
R106,113	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	C58	ECST1A8106	Tantalum 10 μ F 10V
R114	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C59	ECST0GB226ZR	Tantalum 22 μ F 4V
R115	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W	C60	ECST0JY475	Tantalum 4.7 μ F 6.3V
R116	ERJ3GEYJ271	Carbon 270 ohms 1/16W	C61	ECST0GY475Z	Tantalum 4.7 μ F 4V
			C62	ECST1DC685ZR	Tantalum 6.8 μ F 20V
			C63	ECST1C8475ZR	Tantalum 4.7 μ F 16V
			C64	ECST1AD476ZR	Tantalum 47 μ F 10V
			C65	ECST1VY104ZR	Tantalum 0.1 μ F 35V

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
C67	ECST1AC106	Tantalum 10 μ F 10V	SYNC/ENCODER BOARD		
C69	ECST1AB106	Tantalum 10 μ F 10V	PCB3 (NLA)	YWVKDCL35E1A	Printed Circuit Board Assy
C70	ECST0GY106	Tantalum 10 μ F 4V	IC4	AN2254FAP	Lsi
C71	ECST1AB106	Tantalum 10 μ F 10V	IC5	YWM62352GP	IC
C72	ECST1CC106ZR	Tantalum 10 μ F 16V	IC6	YWTC7532FR	IC
C73,75	ECST1AC106	Tantalum 10 μ F 10V	IC7	MN73069LBM2	IC
C77,78	ECST1AC106	Tantalum 10 μ F 10V	IC8	NJM2903M	IC
C80	ECST1AC106	Tantalum 10 μ F 10V	IC9	YWTC7532FR	IC
C82	ECEV1CV100	Electrolytic 10 μ F 16V	IC10	YWTC4569F	IC
C83	ECST1AC106	Tantalum 10 μ F 10V	IC11,12	YWTC7504F	IC
C84-86	ECST1AC226	Tantalum 22 μ F 10V	Q1-3	2SK662-PQR	FET or Transistor
C87	ECST0JB106ZR	Tantalum 10 μ F 6.3V		2SK853	
C88	ECST1AC106	Tantalum 10 μ F 10V	Q7	2SK662-PQR	FET or Transistor
C89	ECST1AC226	Tantalum 22 μ F 10V	Q10	2SK853	Transistor or
C90,91	ECST1AB106	Tantalum 10 μ F 10V	Q11	2SA1774	Transistor or
C92	ECST1AD476ZR	Tantalum 47 μ F 10V		2SB1462	Transistor
C93,95	YW5F104Z2VB	Ceramic 0.1 μ F	Q12	2SA1774	Transistor or
C96	ECST1AY475	Tantalum 4.7 μ F 10V		2SB1462	Transistor
C157	YW5CH100J5VB	Ceramic 10 pF	Q15	2SC4618	Transistor or
C159,160	YW5CH100J5VB	Ceramic 10 pF		2SD4656-QR	Transistor
C160	YW5CH200J5VB	Ceramic 20 pF	Q18	2SA1774	Transistor or
L1,2	ELJFC8R2MF	Coil 8.2 μ H		2SB1462	Transistor
L4,7	ELJFC8R2MF	Coil 8.2 μ H	Q19	2SC4618	Transistor or
L8,10	ELJFC8R2MF	Coil 8.2 μ H		2SD4656-QR	Transistor
L11,13	ELJFC8R2MF	Coil 8.2 μ H	Q29	2SC4617	Transistor or
L14,25	ELJFC8R2MF	Coil 8.2 μ H		2SD2216	Transistor
L28,30	ELJFC8R2MF	Coil 8.2 μ H	Q37,38	UMX1	Transistor or
X1	EF0V8004E0A	Crystal Oscillator	Q39-41	XP4501	Transistor
CF4	ELB4A512	Filter		UMW1	Transistor or
CF5	EIK4EW001T	Filter		XP1501	Transistor
CF6	EIK4EW002T	Filter	Q42	UMX1	Transistor or
CN1,2	YW71756436	16-pin Connector	Q45	XP4501	Transistor
CN3,4	YW523961890	18-pin Connector		UMX1	Transistor or
CN5,6	YW31756316	6-pin Connector	Q46	XP4501	Transistor
J30	YF21160R00T	Jumper Resistor		2SC4617	Transistor or
J45,46	ERJ3GEY0R00	Jumper Resistor		2SD2216	Transistor
J53,58	ERJ3GEY0R00	Jumper Resistor	Q47,48	2SA1774	Transistor or
J59,68	ERJ3GEY0R00	Jumper Resistor		2SB1462	Transistor
J69,72	ERJ3GEY0R00	Jumper Resistor	Q49	2SC4617	Transistor or
J73,76	ERJ3GEY0R00	Jumper Resistor		2SD2216	Transistor
J78,79	ERJ3GEY0R00	Jumper Resistor	Q50	UMZ1TL	Transistor or
J95,99	ERJ3GEY0R00	Jumper Resistor		XP4601TX	Transistor
J118-120	ERJ3GEY0R00	Jumper Resistor	D1	YWD4121	Diode or
J122,131	ERJ3GEY0R00	Jumper Resistor		MA132K	Diode
J132-134	ERJ3GEY0R00	Jumper Resistor	D2-7	MA372	Diode
J136-148	ERJ3GEY0R00	Jumper Resistor	D8,9	MA729	Diode
J150-156	ERJ3GEY0R00	Jumper Resistor	D10,11	YWD4120	Diode
J168-180	ERJ3GEY0R00	Jumper Resistor		MA132A	Diode
J186,190	ERJ3GEY0R00	Jumper Resistor	TH1	YWTCMC220E2	Thermistor
J200	ERJ3GEY0R00	Jumper Resistor	R1	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
			R3	ERJ3GEYJ183	Carbon 18K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R4	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W	R86	ERJ3GEYJ334	Carbon 330K ohms 1/16W
R6,7	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R88	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W
R8	ERJ3GEYJ224	Carbon 220K ohms 1/16W	R90	ERJ3GEYJ113	Carbon 11K ohms 1/16W
R9	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R91	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R10	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R92	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W
R11,12	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R93-95	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R13	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R96	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
R15,16	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R97,98	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R17	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R100	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W
R18	ERJ3GEYJ184	Carbon 180K ohms 1/16W	R101	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R19	ERJ3GEYJ223	Carbon 22K ohms 1/16W	R102	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R21-24	ERJ3GEYJ333	Carbon 33K ohms 1/16W	R103	ERJ3GEYJ391	Carbon 390 ohms 1/16W
R27	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R104	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R28,29	ERJ3GEYJ101	Carbon 100 ohms 1/16W	R105	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R32	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R108	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R33	ERJ3GEYJ511	Carbon 510 ohms 1/16W	R110	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R34,35	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R112	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
R36	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R113	ERJ3GEYJ153	Carbon 15K ohms 1/16W
R37	ERJ3GEYJ561	Carbon 560 ohms 1/16W	R114	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R39	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R115	ERJ3GEYJ432	Carbon 4.3K ohms 1/16W
R40	ERJ3GEYJ153	Carbon 15K ohms 1/16W	R116	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R41,43	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R121	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R44	ERJ3GEYJ182	Carbon 1.8K ohms 1/16W	R122	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R45	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R126	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
R46	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R127	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R47	ERJ3GEYJ221	Carbon 220 ohms 1/16W	R131	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
R48,50	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R132	YF2116431JT	Carbon 430 ohms 1/16W
R51,52	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R134	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W
R53	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W	R136	ERJ3GEYJ622	Carbon 6.2K ohms 1/16W
R54	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R137	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R55	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R138	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R56	ERJ3GEYJ334	Carbon 330K 1/16W	R144	ERJ3GEYJ223	Carbon 22K ohms 1/16W
R57	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R146	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R58	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	R147,148	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W
R59	ERJ3GEYJ104	Carbon 100K ohms 1/16W	R149	ERJ3GEYJ203	Carbon 20K ohms 1/16W
R60	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R150	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R61	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R151	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R62	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R152	ERJ3GEYJ182	Carbon 1.8K ohms 1/16W
R63	ERJ3GEYJ823	Carbon 82K ohms 1/16W	R154	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R64	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W	R163	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R65	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R166	ERJ3GEYJ561	Carbon 560 ohms 1/16W
R66,67	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R167	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R68	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R168	ERJ3GEYJ202	Carbon 2K ohms 1/16W
R70	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R175,179	YWR0816P471D	Metal 470 ohms
R71	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R182	YWR0816P302D	Metal 3K ohms
R73	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R183	YWR0816P751D	Metal 750 ohms
R74,75	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R77	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R189	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R79	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R190	ERJ3GEYJ393	Carbon 39K ohms 1/16W
R80	YWR0816P331D	Metal 330 ohms	R191	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R82	ERJ3GEYJ821	Carbon 820 ohms 1/16W	R192	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R83	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R193	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R84	YWR0816P681D	Metal 680 ohms	R194	ERJ3GEYJ393	Carbon 39K ohms 1/16W
R85	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R195	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
			R196	ERJ3GEYJ113	Carbon 11K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R198	ERJ3GEYJ101	Carbon 100 ohms 1/16W	C75	ECST1AY225ZR	Tantalum 2.2 μ F 10V
R203	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	C76	ECST1AC156	Tantalum 15 μ F 10V
R204	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C77	ECST1VY224	Tantalum 0.22 μ F 35V
R205	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C78	ECST1AC156	Tantalum 15 μ F 10V
R213	ERJ3GEYJ104	Carbon 100K ohms 1/16W	C79	ECST0GC336ZR	Tantalum 33 μ F 4V
R214,215	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C80	ECEV0JV220	Electrolytic 22 μ F 6.3V
R216	ERJ3GEYJ151	Carbon 150 ohms 1/16W	C81,82	ECST1CC106ZR	Tantalum 10 μ F 16V
R217	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C83	ECEV1CV100	Electrolytic 10 μ F 16V
R218	ERJ3GEYJ221	Carbon 220 ohms 1/16W	C85	YF400104FZT	Ceramic 0.1 μ F
R219	ERJ3GEYJ751	Carbon 750 ohms 1/16W	C86	YW5CH101J5VB	Ceramic 100 pF
C1	YF400104FZT	Ceramic 0.1 μ F	C87	YW5F104Z2VB	Ceramic 0.1 μ F
C2	YW5CH120J5VB	Ceramic 12 pF	C88	ECEV1CV100	Electrolytic 10 μ F 16V
C3	YWSX122K5VB	Ceramic 1200 pF	C89	ECST1CY105ZR	Tantalum 1 μ F 16V
C4,5	YW5CH151J5VB	Ceramic 150 pF	C90	YW5F104Z2VB	Ceramic 0.1 μ F
C6	YW5F104Z2VB	Ceramic 0.1 μ F	C91	YW5CH510J5VB	Ceramic 51 pF
C7	YW5CH121J5VB	Ceramic 120 pF	C92	ECST1CY105ZR	Tantalum 1 μ F 16V
C8	YWSX103K2VB	Ceramic 0.01 μ F	C93	ECEV1CV100	Electrolytic 10 μ F 16V
C9	YW5CH910J5VB	Ceramic 91 pF	C94	ECST1ED106ZR	Tantalum 10 μ F 25V
C10	YW5CH750J5VB	Ceramic 75 pF	C95,97	ECEV1CV470	Electrolytic 47 μ F 16V
C11,12	YF400104FZT	Ceramic 0.1 μ F	C98	YF400224FZT	Ceramic 0.22 μ F
C13	YWSX682K2VB	Ceramic 6800 pF	C99	YW5F104Z2VB	Ceramic 0.1 μ F
C14	YW5CH560J5VB	Ceramic 56 pF	C100	YW5CH221J5VB	Ceramic 220 pF
C15	YWSX102K5VB	Ceramic 1000 pF	L1,2	ELJFCBR2MF	Coil 8.2 μ H
C16	YW5CH390J5VB	Ceramic 39 pF	L5	EIC4EJ003E	Coil
C17	YW5CH331J5VB	Ceramic 330 pF	L7,8	ELJFCBR2MF	Coil 8.2 μ H
C18	YW5F104Z2VB	Ceramic 0.1 μ F	L10,11	ELJFCBR2MF	Coil 8.2 μ H
C19	YF400104FZT	Ceramic 0.1 μ F	X1	YWDK17R734	Crystal Oscillator
C21	YW5CH271J5VB	Ceramic 270 pF	X2	YWDK14R187	Crystal Oscillator
C22	YW5CH331J5VB	Ceramic 330 pF	CP1,2	YWNL453254R4	Filter
C23	YW5CH271J5VB	Ceramic 270 pF	CF3	ELB4D537	Filter
C24,25	YWSX103K2VB	Ceramic 0.01 μ F	CF6	YWNL453254R4	Filter
C26	YW5CH270J5VB	Ceramic 27 pF	J30,78	ERJ3GEY0R00	Jumper Resistor
C27	YW5CH331J5VB	Ceramic 330 pF	J120	ERJ3GEY0R00	Jumper Resistor
C28	YWSX103K2VB	Ceramic 0.01 μ F	J123,124	ERJ3GEY0R00	Jumper Resistor
C30,31	YW5F104Z2VB	Ceramic 0.1 μ F	J129	ERJ3GEY0R00	Jumper Resistor
C32,33	YF426104XKS	Ceramic 0.1 μ F	J170	ERJ3GEY0R00	Jumper Resistor
C34-36	YW5F104Z2VB	Ceramic 0.1 μ F	J187	ERJ3GEY0R00	Jumper Resistor
C37	YW5CH220J5VB	Ceramic 22 pF	J199,200	ERJ3GEY0R00	Jumper Resistor
C38-40	YW5F104Z2VB	Ceramic 0.1 μ F	J206	ERJ3GEY0R00	Jumper Resistor
C42,43	YW5F104Z2VB	Ceramic 0.1 μ F	J210	ERJ3GEY0R00	Jumper Resistor
C45	YWSX103K2VB	Ceramic 0.01 μ F	J212	ERJ3GEY0R00	Jumper Resistor
C46	YW400393KKT	Ceramic 0.039 μ F	J220,221	ERJ3GEY0R00	Jumper Resistor
C47-52	YF400104FZT	Ceramic 0.1 μ F	CN1,2	YW41756386	16-pin Connector
C53	ECST0JY335	Tantalum 3.3 μ F 6.3V	CN3	YW523961490	14-pin Connector
C54,56	YF400104FZT	Ceramic 0.1 μ F	TP1-3	YWRC72125TPV	Test-pin
C62	YW400393KKT	Ceramic 0.039 μ F	TP7	YWRC72125TPV	Test-pin
C64,66	ECST1AC106	Tantalum 10 μ F 10V			
C67	ECEV1EV220	Electrolytic 22 μ F 25V			
C68	ECST1AC156	Tantalum 15 μ F 10V			
C69	ECST0JB106ZR	Tantalum 10 μ F 6.3V			
C71	ECST1AC156	Tantalum 15 μ F 10V			
C72	ECEV0JV330	Electrolytic 33 μ F 6.3V			
C73	ECST1AC106	Tantalum 10 μ F 10V			
C74	ECST1CY105ZR	Tantalum 1 μ F 16V			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
REAR BOARD			POWER SUB BOARD		
PCB4 (NLA) D1 R1 R4 C1	YWVKYL350P2A LN277RPX ERDS2TJ750 ERDS2TJ751 RPE132F104Z	Printed Circuit Board Assy LED Carbon 75 ohms 1/4W Carbon 750 ohms 1/4W Ceramic 0.1 μ F	E3 E4 M16 M17	YWPP120 YWBS1040 YVW7DA0284A4 YVW2CA0330A4	Terminal Insulator Heat Sink Hold Plate
C2,3 C4 SW1 SW2-6 CN1	ECEA0JKS331 ECEA0JU471 YWSSSS912L4 YFKHH10914 YVW41746436	Electrolytic 330 μ F 6.3V Electrolytic 470 μ F 6.3V Slide Switch Special Switch 16-pin Connector	POWER SUB BOARD		
CN2,3 E1	YVWHXC0325900 YVWLH53	BNC Connector LED Spacer	PCB7 (NLA) IC1 Q6,7 D1-3 R22 R23 R25 R26 R27	YVWKYL320ESA YWNJM431UTE1 YWCNY17F3G YWCNY17F3G1 YWPC111-B YWF1H4TP ERJ8GCSJ471 ERJ8GCSJ392 ERJ8GCSG302 ERJ8GCSG151 ERD50TJ334	Printed Circuit Board Assy IC Transistor or Transistor or Transistor Diode Carbon 470 ohms 1/8W Carbon 3.9K ohms 1/8W Carbon 3K ohms 1/8W Carbon 150 ohms 1/8W Carbon 330K ohms 1/2W
ALC BOARD			R28-33 R204 C11 C19 C20	ERJ14YJ154H ERJ8GCSJ222 YF426223KXS ECA1EXS330 ECA1CX5470	Carbon 160K ohms 1/4W Carbon 2.2K ohms 1/8W Ceramic 0.022 μ F 50V Electrolytic 33 μ F 25V Electrolytic 47 μ F 16V
PCB5 (NLA) C3-5 C6 L1-4 SW1	YVVKYCL32P3A YW5X102K5VB YW5F1042ZVB ELJFCR68MF SSS342L4N	Printed Circuit Board Assy Ceramic 1000 pF Ceramic 0.1 μ F Coil 0.68 μ H Slide Switch	C22 C23 C24 C25 CN1	ECEA1AKG101 ECA1HX5010 ECA1CX5470 ECA1AKG101 YVW1746360	Electrolytic 100 μ F 10V(KS) Electrolytic 1 μ F 50V Electrolytic 47 μ F 16V Electrolytic 100 μ F 10V(KS) 10-pin Connector
CN1 CN5 M9	YW1746366 YFD4151N200 YVW2SA1859A4	6-pin Connector 4-pin ALC Connector Mounting Angle	E1 E2	JMIBLH04AAT JMIBLH04AAT	4-pin Connector 4-pin Connector
POWER BOARD			ACCESSORY PARTS/PACKAGING PARTS		
PCB6 (NLA) IC2 D4 D6 VS1	YVVKYCL32E4A YVWMA1050 YVWERA1502 YVW51VB40 -ERZC07DK471	Printed Circuit Board Assy IC Diode Diode Znr	CN110 M41 M43 M44 M46	YFE4191J100 YVW8QA2561AN YWT050803 YWT20X35C03 YVW9CA1690AN YVW9CA1683AN YVW9CA1689AN	ALC Connector Operating Instructions Polyethylene Bag Polyethylene Bag CCTV Camera Packaging Assy for WV-CL350/A Packaging Assy for WV-CL350/B Packaging Assy for WV-CL350/G
R11 R12 R13 R14 R18	YWSPR3224J ERJ8GCSJ824 ERJ8GCSG101 ERJ8GCSJ331 ERJ8GCSG221	Metal 220K ohms Carbon 820K ohms 1/8W Carbon 100 ohms 1/8W Carbon 330 ohms 1/8W Carbon 220 ohms 1/8W			
C5 C6 C8,12 C17 C18	ECKD3A101KBN ECQU2A333MV YVWDE710F2472 ECKDHT102KB RJ3400V100M	Ceramic 100 pF 1KV Plastic 0.033 μ F Ceramic 4700 pF Ceramic 1000 pF Electrolytic 10 μ F 400V			
C26 T1 CF1 F1 E1,2	YVWDE710F2472 YVWPCW19 YVWFC061 XBA2C04ET0A S-N5057	Ceramic 4700 pF Power Transformer Filter Current Fuse 400mA 250V Fuse Holder			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
COLOR CCTV CAMERA WV-CL352			DRIVE BOARD		
MISCELLANEOUS			PCB1 (MLA)	YWVBCL352EA	Printed Circuit Board Assy
Q101	25B941-PQR	Transistor	IC1	YWTC7532FR	IC
M1	YWV58A0082A2	Front Escutcheon	IC2	YWCXA1439M	IC
M2	YWVAKA0920AN	Head Optical Assy	IC3	MNS3003LBJ	IC
M3	YWV25B1851A1	Main Mounting Angle	IC5	NJM2904M	IC
M4	YWV4JA0262A4	Coil Spring	IC6	YWM8621488U	IC
M5	YWV1EA0127A4	Special Screw for FB Lock	IC7	YWUPD16501GS	IC
M6	YWV1EA0128A4	Special Screw for Front	IC8,9	-MN13821PTW	IC
M7	YWV3FA0101A3	FB Control Ring	IC10	NJM3414M	IC
M8	YWBC-28	Body Cap	IC14	NJM2904M	IC
M10	YWV5WB1197A4	Right Side Panel	IC20,21	YWTC7532FR	IC
M11	YWV5WB1198A4	Left Side Panel	Q1-4	25C4619	Transistor or
M12	YWV5EA0978A2	Bottom Cover		25C4627	Transistor
M15	YWV25A1860A4	Mounting Angle	Q6	25K662-PQR	FET or
M16	YWV7DA0242A4	Heat Sink		25K853	Transistor
M18	YWV2KA0655B2	Rear Chassis	Q7	25B766-R5	Transistor
M19	YWV5WA1203A4	Rear Panel	Q10	25A1576	Transistor or
M20	YWV58A0083A3	Rear Escutcheon		25B1218QRS	Transistor
M22	YWV5EA0977A2	Upper Cover	Q12,13	25C4617	Transistor or
M23	YWV5GA0114A4	Side Cap		25D2216	Transistor
M24	YWV2TB0240A3	Mounting Bracket	Q17,18	25A1774	Transistor or
M26	YWV7MA0270A4	Safety Label		25B1462	Transistor
M28	YWV7SA1338A4	Side Label	Q19-22	25C4617	Transistor or
M29	Not Supply	UL Safety Label		25D2216	Transistor
M30	YWV7QA2634A4	Main Label	Q23	25A1774	Transistor or
M31	Not Supply	FCC Safety Label	Q24	25B1462	Transistor
M32	YFV2NA0084A4	Spacer		25C4617	Transistor or
M33	YFV2PA0207A4	Insulator Sheet		25D2216	Transistor
M34	YWV7SA1335A4	Operation Label	Q27	25D874-R5	Transistor
M35	YWV1KA0128A4	Insulator Washer	Q30	25B766-R5	Transistor
M36	YWV3AA0129A4	Dust Proof Parts	Q33-36	25A1774	Transistor or
				25B1462	Transistor
			Q38	25C4617	Transistor or
				25D2216	Transistor
			Q39	25A1774	Transistor or
				25B1462	Transistor
			D1	YWDA121	Diode or
				MA132K	Diode
			D2	YWDA221	Diode or
				MA133	Diode
			D4	YWDA221	Diode or
				MA133	Diode
			D5	YWDT211	Diode or
				MA8110	Diode
			D6	YWDT220	Diode or
				MA8200	Diode
			D7	MA372	Diode
			D8	MA372	Diode
			D11,12	YWDA121	Diode or
				MA132K	Diode

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R1	ERJ3GEYJ912	Carbon	9.1K ohms 1/16W	R126	YWR0816P243D	Metal	24Kohms
R2,3	ERJ3GEYJ911	Carbon	910 ohms 1/16W	R127	YWR0816P103D	Metal	10Kohms
R4	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R130	YWR0816P242D	Metal	2.4Kohms
R5,7	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	R131	YWR0816P153D	Metal	15Kohms
R9	ERJ3GEYJ391	Carbon	390 ohms 1/16W	R134	ERJ3GEYJ104	Carbon	100K ohms 1/16W
R10	ERJ3GEYJ101	Carbon	100 ohms 1/16W	R136	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R11	ERJ3GEYJ221	Carbon	220 ohms 1/16W	R137	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R12	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R139	ERJ3GEYJ153	Carbon	15K ohms 1/16W
R13	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W	R140	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R14	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R141	ERJ3GEYJ154	Carbon	150K ohms 1/16W
R15	ERJ3GEYJ331	Carbon	330 ohms 1/16W	R143	ERJ3GEYJ103	Carbon	10K ohms 1/16W
R16	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R144	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R18	ERJ3GEYJ331	Carbon	330 ohms 1/16W	R145,146	YWR0816P103D	Metal	10K ohms
R22	ERJ3GEYJ221	Carbon	220 ohms 1/16W	R147	ERJ3GEYJ560	Carbon	56 ohms 1/16W
R24	ERJ3GEYJ302	Carbon	3K ohms 1/16W	R148	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W
R26	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R155,156	ERJ3GEYJ473	Carbon	47K ohms 1/16W
R29	ERJ3GEYJ750	Carbon	7.5K ohms 1/16W	R163	ERJ3GEYJ470	Carbon	47 ohms 1/16W
R33,34	ERJ3GEYJ100	Carbon	10 ohms 1/16W	R164	YWR0816P242D	Metal	2.4Kohms
R37	ERJ3GEYJ101	Carbon	100 ohms 1/16W	R165	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R44,45	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R166	ERJ3GEYJ470	Carbon	47 ohms 1/16W
R48	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R167	ERJ3GEYJ512	Carbon	5.1K ohms 1/16W
R49	ERJ3GEYJ101	Carbon	100 ohms 1/16W	R213	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R50	ERJ3GEYJ221	Carbon	220 ohms 1/16W	R214	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W
R53	ERJ3GEYJ681	Carbon	680 ohms 1/16W	R215	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W
R54,58	ERJ3GEYJ103	Carbon	10K ohms 1/16W	R216	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W
R72	YWR0816P302D	Metal	3K ohms	R217	ERJ3GEYJ101	Carbon	100 ohms 1/16W
R76	ERJ3GEYJ101	Carbon	100 ohms 1/16W	R219-221	ERJ3GEYJ102	Carbon	1K ohms 1/16W
R77	YWR0816P242D	Metal	2.4K ohms	R228	ERJ3GEYJ331	Carbon	330 ohms 1/16W
R78	ERJ3GEYJ102	Carbon	1K ohms 1/16W	R229	ERJ3GEYJ821	Carbon	820 ohms 1/16W
R79	YWR0816P332D	Metal	3.3K ohms	R231	YWR0816P302D	Metal	3K ohms
R80	YWR0816P222D	Metal	2.2K ohms	R232	YF2116101JT	Carbon	100 ohms 1/10W
R84	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C5,6	YW5CH100J5V8	Ceramic	10 pF
R85	ERJ3GEYJ222	Carbon	2.2K ohms 1/16W	C7	YW5X103K2V8	Ceramic	0.01 pF
R86	ERJ3GEYJ152	Carbon	1.5K ohms 1/16W	C8	YW5SL102K5V8	Ceramic	1000 pF
R87,88	ERJ3GEYJ101	Carbon	100 ohms 1/16W	C9	YW5CH101J5V8	Ceramic	100 pF
R90-92	ERJ3GEYJ101	Carbon	100 ohms 1/16W	C10	YW5CH331J5V8	Ceramic	330 pF
R94	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C12	YW5F104Z2V8	Ceramic	0.1 pF
R95	ERJ3GEYJ202	Carbon	2K ohms 1/16W	C13	YW5CH331J5V8	Ceramic	330 pF
R96	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C14,15	YW5X103K2V8	Ceramic	0.01 pF
R99	ERJ3GEYJ243	Carbon	24K ohms 1/16W	C16	YW5CH101J5V8	Ceramic	100 pF
R101	ERJ3GEYJ105	Carbon	1M ohms 1/16W	C19	YW5F104Z2V8	Ceramic	0.1 pF
R104	ERJ3GEYJ104	Carbon	100K ohms 1/16W	C26	YF400224FZT	Ceramic	0.22 pF
R113	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C28	YW5X103K2V8	Ceramic	0.01 pF
R114	ERJ3GEYJ620	Carbon	62 ohms 1/16W	C33	YF400104FZT	Ceramic	0.1 pF
R115	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C35,36	YF400104FZT	Ceramic	0.1 pF
R116	ERJ3GEYJ332	Carbon	3.3K ohms 1/16W	C37	ECEV1CV470	Electrolytic	47 pF 16V
R117	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C38	ECEV1CV100	Electrolytic	10 pF 16V
R118	YWR0816P302D	Metal	3K ohms	C39	ECST1VY1042R	Tantalum	0.1 pF 35V
R119	YWR0816P153D	Metal	15Kohms	C40	ECST1CC106Z	Tantalum	10 pF 20V
R120	ERJ3GEYJ152	Carbon	1.5K ohms 1/16W	C41	ECST1CC1062R	Tantalum	10 pF 16V
R121	ERJ3GEYJ100	Carbon	10 ohms 1/16W	C43	ECEV1CV100	Electrolytic	10 pF 16V
R122	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C44,45	ECST1CC1062R	Tantalum	10 pF 16V
R123	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W	C46	ECEV1HV2R25R	Electrolytic	2.2 pF 50V
R124	YWR0816P472D	Metal	4.7K ohms	C54	ECEV1CV470	Electrolytic	47 pF 16V
R125	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C56	ECST1CC1062R	Tantalum	10 pF 16V

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
C57	ECST1VD685	Tantalum 6.8 μ F 35V	DIGITAL BOARD		
C60	ECEV1CV100	Electrolytic 10 μ F 16V	PCB2 (NLA)	YWVKCL352EA	Printed Circuit Board Assy
C62	ECEV1HV100SP	Electrolytic 10 μ F 50V	IC1	AN2015FAP	IC
C63	ECEV1EV220	Electrolytic 22 μ F 25V	IC2,3	NJM4558M	IC
C68,70	ECEV1CV470	Electrolytic 47 μ F 16V	IC6	YWCXD1175AM	IC
			IC7	YW6M6M80021FP	IC
C72	ECST0GY106	Tantalum 10 μ F 4V	IC8	MN6730FHP	IC
C74	ECST1CY105ZR	Tantalum 1 μ F 16V	IC9	MN6731FHP	IC
C77	YWSF4732ZVB	Ceramic 0.047 μ F	IC10	MN188166CUA	IC
C78	YWSX222K5VB	Ceramic 2200 pF	IC12	MN65701FHP	IC
C79,81	YWSF1042ZVB	Ceramic 0.1 μ F	IC13	MN53020LB01	IC
C82,83	ECEV1CV100	Electrolytic 10 μ F 16V	IC14	M50554254FP	IC
C95	ECEV1CV470	Electrolytic 47 μ F 16V	IC15	YWTC7S3ZFR	IC
C103	ECST1AD476ZR	Tantalum 47 μ F 10V	Q8	2SC4617	Transistor or
C105	YWSCH151J5VB	Ceramic 150 pF		2SD2216	Transistor
C107	YWSCH120J5VB	Ceramic 12 pF	Q9,10	2SA1774	Transistor or
C114	ECEV1CV470	Electrolytic 47 μ F 16V		2SB1462	Transistor
C115	ECEV1CV100	Electrolytic 10 μ F 16V	Q11	2SC4617	Transistor or
C117	ECEV1HW47ZSP	Electrolytic 4.7 μ F 50V		2SD2216	Transistor
C118-120	YWSX102K5VB	Ceramic 1000 pF	Q14-17	2SC4617	Transistor or
C123,124	YWSX102K5VB	Ceramic 1000 pF		2SD2216	Transistor
C138	ECEV1CV470	Electrolytic 47 μ F 16V	Q18-25	FA3L4ZT1B	Transistor
C144	ECEV1EV330	Electrolytic 33 μ F 25V	Q26	2SA1774	Transistor or
L1	ELJFCR2MF	Coil 8.2 μ H		2SB1462	Transistor
L56	ELJFCR2MF	Coil 8.2 μ H	Q27	2SC4617	Transistor or
L10	ELJFCR2MF	Coil 8.2 μ H		2SD2216	Transistor
L12	EIC4EJ004E	Coil	D2-4	YWDA221	Diode or
L15	ELJFCR2MF	Coil 8.2 μ H		MA133	Diode
L18	ELJFCR2MF	Coil 8.2 μ H	TH215	L311F431J502	Thermistor
L21	YWCD75391KC	Coil	R9	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
L22	YWNL32T221K	Coil	R19	ERJ3GEYJ473	Carbon 47K ohms 1/16W
CF1	ELB48532	Filter	R20	ERJ3GEYJ103	Carbon 10K ohms 1/16W
CN1	YWS23961490	14-pin Connector	R21	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
CN2	YWS22051890	18-pin Connector	R23	ERJ3GEYJ112	Carbon 1.1K ohms 1/16W
CN3	YWS22051490	14-pin Connector	R25	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
CN4	YW31756356	6-pin Connector	R28	ERJ3GEYJ391	Carbon 390 ohms 1/16W
CN7	YWS22051890	18-pin Connector	R31	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W
CN8,9	YW71756436	16-pin Connector	R33	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
J21,27	ERJ3GEY0R00	Jumper Resistor	R34,36	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
J32,36	ERJ3GEY0R00	Jumper Resistor	R37	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
J40,43	ERJ3GEY0R00	Jumper Resistor	R38-41	ERJ3GEYJ682	Carbon 6.8K ohms 1/16W
J50-52	ERJ3GEY0R00	Jumper Resistor	R42-44	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
J61,63	ERJ3GEY0R00	Jumper Resistor	R47	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
J66,68	ERJ3GEY0R00	Jumper Resistor	R48	ERJ3GEYJ101	Carbon 100 ohms 1/16W
J70,86	ERJ3GEY0R00	Jumper Resistor	R50	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W
J91,109	ERJ3GEY0R00	Jumper Resistor	R56	ERJ3GEYJ101	Carbon 100 ohms 1/16W
J112,142	ERJ3GEY0R00	Jumper Resistor	R77	ERJ3GEYJ100	Carbon 10 ohms 1/16W
J153,154	ERJ3GEY0R00	Jumper Resistor	R82,85	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
J159,160	ERJ3GEY0R00	Jumper Resistor	R94	ERJ3GEYJ472	Carbon 4.7K ohms 1/16W
J233	ERJ3GEY0R00	Jumper Resistor	R96	YWR0816P221D	Metal 220 ohms
J237,238	YF21160R00T	Jumper Resistor	R97	YWR0816P102D	Metal 1K ohms
TP1	YWRC7212STPV	Test-pin			

REF.NO.	PART NO.	DESCRIPTION		REF.NO.	PART NO.	DESCRIPTION	
R98	YWR0816Q560D	Metal	56 ohms	C56	ECST0JY475	Tantalum	4.7 μ F 6.3V
R100,101	YWR0816P221D	Metal	220 ohms	C57	ECST0JY685	Tantalum	6.8 μ F 6.3V
R104	YWR0816P472D	Metal	4.7K ohms	C58	ECST1AB106	Tantalum	10 μ F 10V
R105	YWR0816P562D	Metal	5.6K ohms	C59	ECST0GB2262R	Tantalum	22 μ F 4V
R106,113	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C60	ECST0JY475	Tantalum	4.7 μ F 6.3V
R114	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C61	ECST0GY475Z	Tantalum	4.7 μ F 4V
R115	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C62	ECST1DC6852R	Tantalum	6.8 μ F 20V
R116	ERJ3GEYJ271	Carbon	270 ohms 1/16W	C63	ECST1CB4752R	Tantalum	4.7 μ F 16V
R117	ERJ3GEYJ472	Carbon	4.7K ohms 1/16W	C64	ECST1AD4762R	Tantalum	47 μ F 10V
R123	ERJ3GEYJ105	Carbon	1M ohms 1/16W	C65	ECST1VY1042R	Tantalum	0.1 μ F 35V
R158,160	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W	C67	ECST1AC106	Tantalum	10 μ F 10V
R161	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C69	ECST1AB106	Tantalum	10 μ F 10V
R162	ERJ3GEYJ122	Carbon	1.2K ohms 1/16W	C70	ECST0GY106	Tantalum	10 μ F 4V
R163,164	ERJ3GEYJ682	Carbon	6.8K ohms 1/16W	C71	ECST1AB106	Tantalum	10 μ F 10V
R166,167	ERJ3GEYJ471	Carbon	470 ohms 1/16W	C72	ECST1CC1062R	Tantalum	10 μ F 16V
R184,185	ERJ3GEYJ473	Carbon	47K ohms 1/16W	C73,75	ECST1AC106	Tantalum	10 μ F 10V
R187	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C77,78	ECST1AC106	Tantalum	10 μ F 10V
R188	ERJ3GEYJ392	Carbon	3.9K ohms 1/16W	C80	ECST1AC106	Tantalum	10 μ F 10V
R189	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C82	ECCEV1CV100	Electrolytic	10 μ F 16V
				C83	ECST1AC106	Tantalum	10 μ F 10V
R191	ERJ3GEYJ102	Carbon	1K ohms 1/16W	C84-86	ECST1AC226	Tantalum	22 μ F 10V
R192	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W	C87	ECST0JB1062R	Tantalum	10 μ F 6.3V
R193	ERJ3GEYJ821	Carbon	820 ohms 1/16W	C88	ECST1AC106	Tantalum	10 μ F 10V
R194	ERJ3GEYJ562	Carbon	5.6K ohms 1/16W	C89	ECST1AC226	Tantalum	22 μ F 10V
R195	ERJ3GEYJ100	Carbon	10 ohms 1/16W	C90,91	ECST1AB106	Tantalum	10 μ F 10V
R196	ERJ3GEYJ2R2	Carbon	2.2 ohms 1/16W	C92	ECST1AD4762R	Tantalum	47 μ F 10V
R197	ERJ3GEYJ221	Carbon	220 ohms 1/16W	C93,95	YW5F104Z2VB	Ceramic	0.1 μ F
R198	ERJ3GEYJ103	Carbon	10K ohms 1/16W	C96	ECST1AY475	Tantalum	4.7 μ F 10V
R199	ERJ3GEYJ181	Carbon	180 ohms 1/16W	C157	YW5CH100J5VB	Ceramic	10 pF
				C159,	YW5CH100J5VB	Ceramic	10 pF
R214	ERJ3GEYJ104	Carbon	100K ohms 1/16W	C160	YW5CH200J5VB	Ceramic	20 pF
Z1-6	EXBVBV470J	Block Resistor		L1	ELJFCBR2MF	Coil	8.2 μ H
C3	YW5F473Z2VB	Ceramic	0.047 μ F	L2	ELJFCBR2MF	Coil	8.2 μ H
C6-8	YW5CH120J5VB	Ceramic	12 pF	L4	ELJFCBR2MF	Coil	8.2 μ H
C9	YW5CH151J5VB	Ceramic	150 pF	L7,8	ELJFCBR2MF	Coil	8.2 μ H
C10	YW5CH101J5VB	Ceramic	100 pF	L10	ELJFCBR2MF	Coil	8.2 μ H
C12	YW5CH120J5VB	Ceramic	12 pF	L11	ELJFCBR2MF	Coil	8.2 μ H
C15	YW5CH330J5VB	Ceramic	33 pF	L13,14	ELJFCBR2MF	Coil	8.2 μ H
C16	YW5CH151J5VB	Ceramic	150 pF	L25	ELJFCBR2MF	Coil	8.2 μ H
C17	YW5X102K5VB	Ceramic	1000 pF	L28	ELJFCBR2MF	Coil	8.2 μ H
C18	YW5CH120J5VB	Ceramic	12 pF	L30	ELJFCBR2MF	Coil	8.2 μ H
C20	YW5CH150J5VB	Ceramic	15 pF	X1	EF0V8004E0A	Crystal Oscillator	
C21	YW5CH101J5VB	Ceramic	100 pF	CF4	E1K4A512	Filter	
C22	YW5CH151J5VB	Ceramic	150 pF	CF5	E1K4EW001T	Filter	
C23	YW5F104Z2VB	Ceramic	0.1 μ F	CF6	E1K4EW002T	Filter	
C27,29	YW5CH101J5VB	Ceramic	100 pF	J16-21	YF21160R00T	Jumper Resistor	
C32,35	YW5F104Z2VB	Ceramic	0.1 μ F	J26,29	YF21160R00T	Jumper Resistor	
C36	YW400474FZ	Ceramic	0.47 μ F	J31,32	YF21160R00T	Jumper Resistor	
C37	YW5F104Z2VB	Ceramic	0.1 μ F	J45,46	ERJ3GEY0R00	Jumper Resistor	
C38-40	YW5CH120J5VB	Ceramic	12 pF	J53	ERJ3GEY0R00	Jumper Resistor	
C42	YW5CH331J5VB	Ceramic	330 pF				
C45	YW5F104Z2VB	Ceramic	0.1 μ F				
C46,47	YF400104FZT	Ceramic	0.1 μ F				
C48	ECST0JY335	Tantalum	3.3 μ F 6.3V				
C49,50	YF400103XKT	Ceramic	0.01 μ F				

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
J58,59	ERJ3GEY0R00	Jumper Resistor	Q45	UMX1	Transistor or
J68,J69	ERJ3GEY0R00	Jumper Resistor	Q46	XP4501	Transistor
J72,73	ERJ3GEY0R00	Jumper Resistor		25C4617	Transistor or
J76	ERJ3GEY0R00	Jumper Resistor		25D2216	Transistor
J78,79	ERJ3GEY0R00	Jumper Resistor	Q47,48	25A1774	Transistor or
J95,99	ERJ3GEY0R00	Jumper Resistor		25B1462	Transistor
J118-120	ERJ3GEY0R00	Jumper Resistor	Q49	25C4617	Transistor or
J122	ERJ3GEY0R00	Jumper Resistor		25D2216	Transistor
J131-134	ERJ3GEY0R00	Jumper Resistor	Q50	UMZ1	Transistor or
J136-148	ERJ3GEY0R00	Jumper Resistor		XP4601	Transistor
J150-156	ERJ3GEY0R00	Jumper Resistor	D1	YWDA121	Diode
J168-180	ERJ3GEY0R00	Jumper Resistor		MA132K	Diode or
J186,190	ERJ3GEY0R00	Jumper Resistor	D2-7	MA372	Diode
CN1,2	YW71756436	16-pin Connector	D8,9	MA729	Diode
CN3,4	YW523961890	18-pin Connector	D10,11	YWDA120	Diode or
CN5,6	YW31756316	16-pin Connector		MA132A	Diode
SYNC / ENCODER BOARD			TH1	YWTCMC220E2	Thermistor
PCB3 (HLA)	YVVKDCL35E2A	Printed Circuit Board Assy	R1	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
IC4	AN2254FAP	LSI	R3	ERJ3GEYJ183	Carbon 18K ohms 1/16W
IC5	YWM62352GP	IC			
IC6	YWTC7532FR	IC	R4	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W
IC7	MN73069LBM2	IC	R6,7	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
IC8	NJM2903M	IC	R8	ERJ3GEYJ224	Carbon 220K ohms 1/16W
IC9	YWTC7532FR	IC	R9	ERJ3GEYJ102	Carbon 1K ohms 1/16W
IC10	YWTC4569F	IC	R10	ERJ3GEYJ105	Carbon 1M ohms 1/16W
IC11,12	YWTC7504F	FET or	R11,12	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q1-3	25K662-PQR		R13	ERJ3GEYJ333	Carbon 33K ohms 1/16W
	25K853	Transistor	R15,16	ERJ3GEYJ103	Carbon 10K ohms 1/16W
Q7	25K662-PQR	FET or	R17	ERJ3GEYJ333	Carbon 33K ohms 1/16W
	25K853	Transistor	R18	ERJ3GEYJ184	Carbon 180K ohms 1/16W
Q10-12	25A1774	Transistor or	R19	ERJ3GEYJ223	Carbon 22K ohms 1/16W
	25B1462	Transistor	R21-24	ERJ3GEYJ333	Carbon 33K ohms 1/16W
Q15	25C4618	Transistor or	R27	ERJ3GEYJ103	Carbon 10K ohms 1/16W
	25D4656-QR	Transistor	R28,29	ERJ3GEYJ101	Carbon 100 ohms 1/16W
Q18	25A1774	Transistor or	R32	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
	25B1462	Transistor	R33	ERJ3GEYJ511	Carbon 510 ohms 1/16W
Q19	25C4618	Transistor or	R34,35	ERJ3GEYJ102	Carbon 1K ohms 1/16W
	25D4656-QR	Transistor	R36	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
Q29	25C4617	Transistor	R37	ERJ3GEYJ561	Carbon 560 ohms 1/16W
	25D2216	Transistor	R39	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
Q37-42	UMX1	Transistor or	R40	ERJ3GEYJ153	Carbon 15K ohms 1/16W
	XP4501	Transistor	R41,43	ERJ3GEYJ221	Carbon 220 ohms 1/16W
			R44	ERJ3GEYJ182	Carbon 18K ohms 1/16W
			R45	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R46	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
			R47	ERJ3GEYJ221	Carbon 220 ohms 1/16W
			R48,50	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R51,52	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R53	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W
			R54	ERJ3GEYJ105	Carbon 1M ohms 1/16W
			R55	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
			R56	ERJ3GEYJ334	Carbon 330K 1/16W
			R57	ERJ3GEYJ102	Carbon 1K ohms 1/16W
			R58	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
R59	ERJ3GEYJ104	Carbon 100K ohms 1/16W	R150	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R60	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R151	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R61	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R152	ERJ3GEYJ182	Carbon 1.8K ohms 1/16W
R62	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R154	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R63	ERJ3GEYJ823	Carbon 82K ohms 1/16W	R163	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R64	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W	R166	ERJ3GEYJ561	Carbon 560 ohms 1/16W
R65	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R167	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R66,67	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R168	ERJ3GEYJ202	Carbon 2K ohms 1/16W
R68	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R176,179	YWR0816P471D	Metal 470 ohms
R70	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R182	YWR0816P302D	Metal 3K ohms
R71	ERJ3GEYJ105	Carbon 1M ohms 1/16W	R183	YWR0816P751D	Metal 750 ohms
R73	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R188	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R74,75	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R189	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R77	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R190	ERJ3GEYJ393	Carbon 39K ohms 1/16W
R79	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R191	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R80	YWR0816P331D	Metal 330 ohms	6W		
R82	ERJ3GEYJ821	Carbon 820 ohms 1/16W	R192	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R83	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R193	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R84	YWR0816P681D	Metal 680 ohms	R194	ERJ3GEYJ393	Carbon 39K ohms 1/16W
R85	ERJ3GEYJ103	Carbon 10K ohms 1/16W	R195	ERJ3GEYJ392	Carbon 3.9K ohms 1/16W
R86	ERJ3GEYJ334	Carbon 330K 1/16W	R196	ERJ3GEYJ113	Carbon 11K ohms 1/16W
R88	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R198	ERJ3GEYJ101	Carbon 100 ohms 1/16W
R90	ERJ3GEYJ113	Carbon 11K ohms 1/16W	R203	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W
R91	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R204	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W
R92	ERJ3GEYJ912	Carbon 9.1K ohms 1/16W	R205	ERJ3GEYJ103	Carbon 10K ohms 1/16W
R93-95	ERJ3GEYJ102	Carbon 1K ohms 1/16W	R213	ERJ3GEYJ104	Carbon 100K ohms 1/16W
R96	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W	R214,215	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W
R97,98	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	R216	ERJ3GEYJ151	Carbon 150 ohms 1/16W
R100	ERJ3GEYJ272	Carbon 2.7K ohms 1/16W	R217	ERJ3GEYJ102	Carbon 1K ohms 1/16W
R101	ERJ3GEYJ152	Carbon 1.5K ohms 1/16W	R218	ERJ3GEYJ221	Carbon 220 ohms 1/16W
R102	ERJ3GEYJ153	Carbon 15K ohms 1/16W	R219	ERJ3GEYJ751	Carbon 750 ohms 1/16W
R103	ERJ3GEYJ391	Carbon 390 ohms 1/16W	C1	YF400104FZT	Ceramic 0.1 μ F
R104	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C2	YW5CH120J5VB	Ceramic 12 pF
R105	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C3	YW5X122K5VB	Ceramic 1200 pF
R108	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C4,5	YW5CH151J5VB	Ceramic 150 pF
R110	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C6	YW5F104Z2VB	Ceramic 0.1 μ F
R112	ERJ3GEYJ562	Carbon 5.6K ohms 1/16W	C7	YW5CH121J5VB	Ceramic 120 pF
R113	ERJ3GEYJ153	Carbon 15K ohms 1/16W	C8	YW5X103K2VB	Ceramic 0.01 μ F
R114	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C9	YW5CH910J5VB	Ceramic 91 pF
R115	ERJ3GEYJ432	Carbon 4.3K ohms 1/16W	C10	YW5CH750J5VB	Ceramic 75 pF
R116	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C11,12	YF400104FZT	Ceramic 0.1 μ F
R121	ERJ3GEYJ222	Carbon 2.2K ohms 1/16W	C13	YW5X68K2VB	Ceramic 6800 pF
R122	ERJ3GEYJ751	Carbon 750 ohms 1/16W	C14	YW5CH560J5VB	Ceramic 56 pF
R126	ERJ3GEYJ122	Carbon 1.2K ohms 1/16W	C15	YW5X102K5VB	Ceramic 1000 pF
R127	ERJ3GEYJ751	Carbon 750 ohms 1/16W	C16	YW5CH390J5VB	Ceramic 39 pF
R131	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W	C17	YW5CH331J5VB	Ceramic 330 pF
R132	YF2116431JT	Carbon 430 ohms 1/16W	C18	YW5F104Z2VB	Ceramic 0.1 μ F
R134	ERJ3GEYJ822	Carbon 8.2K ohms 1/16W	C19	YF400104FZT	Ceramic 0.1 μ F
R136	ERJ3GEYJ622	Carbon 6.2K ohms 1/16W	C21	YW5CH271J5VB	Ceramic 270 pF
R137	ERJ3GEYJ102	Carbon 1K ohms 1/16W	C22	YW5CH331J5VB	Ceramic 330 pF
R138	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C24,25	YW5X103K2VB	Ceramic 0.01 μ F
R144	ERJ3GEYJ223	Carbon 22K ohms 1/16W	C26	YW5CH270J5VB	Ceramic 27 pF
R146	ERJ3GEYJ103	Carbon 10K ohms 1/16W	C27	YW5CH331J5VB	Ceramic 330 pF
R147,148	ERJ3GEYJ752	Carbon 7.5K ohms 1/16W	C28	YW5X103K2VB	Ceramic 0.01 μ F
R149	ERJ3GEYJ203	Carbon 20K ohms 1/16W	C30,31	YF400104FZT	Ceramic 0.1 μ F
			C32,33	YF426104XKS	Ceramic 0.1 μ F

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
C34-36	YW5F104Z2VB	Ceramic 0.1 μ F	J124,129	ERJ3GEY0R00	Jumper Resistor
C37	YW5CH220J5VB	Ceramic 22 pF	J170,187	ERJ3GEY0R00	Jumper Resistor
C38-40	YW5F104Z2VB	Ceramic 0.1 μ F	J199,200	ERJ3GEY0R00	Jumper Resistor
C42,43	YW5F104Z2VB	Ceramic 0.1 μ F	J206,210	ERJ3GEY0R00	Jumper Resistor
C45	YF400104F2T	Ceramic 0.1 μ F	E1-3	YWRCT2125TPV	Test-pin
			E7	YWRCT2125TPV	Test-pin
C46	YW400393XKT	Ceramic 0.039 μ F	REAR BOARD		
C47-52	YF400104F2T	Ceramic 0.1 μ F			
C53	ECST0JY335	Tantalum 3.3 μ F 6.3V			
C54,56	YF400104F2T	Ceramic 0.1 μ F			
C61	ECST1AC106	Tantalum 10 μ F 10V			
C62	YW400393XKT	Ceramic 0.039 μ F			
C64,66	ECST1AC106	Tantalum 10 μ F 10V			
C67	ECEV1EV220	Electrolytic 22 μ F 25V			
C68	ECST1AC156	Tantalum 15 μ F 10V			
C69	ECST1AY225Z2R	Tantalum 2.2 μ F 10V			
C71	ECST1AC156	Tantalum 15 μ F 10V	PCB4 (NLA)	YWVKYL352P2A	Printed Circuit Board Assy
C72	ECEV0JY330	Electrolytic 33 μ F 6.3V	D1	LN277RPX	LED
C73	ECST1AC106	Tantalum 10 μ F 10V	R1	ERDS2TJ750	Carbon 75 ohms 1/4W
C74	ECST1CY105Z2R	Tantalum 1 μ F 16V	R4	ERDS2TJ751	Carbon 750 ohms 1/4W
C75	ECST1AY225Z2R	Tantalum 2.2 μ F 10V	C1	RPE132F104Z	Ceramic 0.1 μ F
C76	ECST1AC156	Tantalum 15 μ F 10V	C2,3	ECEA0JKS331	Electrolytic 330 μ F 6.3V
C77	ECST1VY224	Tantalum 0.22 μ F 35V	C4	ECEA0JU471	Electrolytic 470 μ F 6.3V
C78	ECST1AC156	Tantalum 15 μ F 10V	C5	ECKF1H222MD	Ceramic 2200 pF 50V
C79	ECST0GC336Z2R	Tantalum 33 μ F 4V	SW1	YWS555912L4	Slide Switch
C80	ECEV0JY220	Electrolytic 22 μ F 6.3V	SW2-6	YFKHH10914	Special Switch
C81,82	ECST1CC106Z2R	Tantalum 10 μ F 16V	CN1	YW51746430	16-pin Connector
C83	ECEV1CV100	Electrolytic 10 μ F 16V	CN2,3	YWHXC0325900	BNC Connector
C85	YF400104F2T	Ceramic 0.1 μ F	E1	YWLH53	LED Spacer
C86	YW5CH101J5VB	Ceramic 100 pF	E101	YF40S18YF2P	2-pin Terminal Board
C87	YW5F104Z2VB	Ceramic 0.1 μ F	M25	YFV2NA0071A4	Spacer
C88	ECEV1CV100	Electrolytic 10 μ F 16V	ALC BOARD		
C89	ECST1CY105Z2R	Tantalum 1 μ F 16V			
C90	YW5F104Z2VB	Ceramic 0.1 μ F			
C91	YW5CH510J5VB	Ceramic 51 pF			
C92	ECST1CY105Z2R	Tantalum 1 μ F 16V			
C93	ECEV1CV100	Electrolytic 10 μ F 16V			
C94	ECST1ED106Z2R	Tantalum 10 μ F 25V			
C95,97	ECEV1CV470	Electrolytic 47 μ F 16V			
C98	YF400224F2T	Ceramic 0.22 μ F			
C99	YW5F104Z2VB	Ceramic 0.1 μ F			
C100	YW5CH221J5VB	Ceramic 220 pF	PCB5 (NLA)	YWVKYL32P3A	Printed Circuit Board Assy
L1,2	ELJFCB82MF	Coil 8.2 μ H	C3-5	YW5X102K5VB	Ceramic 1000 pF
L5	EIC4EJ003E	Coil	C6	YW5F104Z2VB	Ceramic 0.1 μ F
L7,8	ELJFCB82MF	Coil 8.2 μ H	L1-4	ELJFCB8MF	Coil 0.68 μ H
L10,11	ELJFCB82MF	Coil 8.2 μ H	SW1	SSS342L4N	Slide Switch
X1	YWDX17R734	Crystal Oscillator	CN1	YW1746366	6-pin Connector
X2	YWDX14R187	Crystal Oscillator	CN5	YFD4151N200	ALC Connector
CF1,2	YWNL453254R4	Filter	M9	YVW25A1859A4	Mounting Angle
CF3	ELB4D525	Filter			
CF4	ELB4C531	Filter			
CF6	YWNL453254R4	Filter			
CN1,2	YW41756386	16-pin Connector			
CN3	YW523961490	14-pin Connector			
J31,78	ERJ3GEY0R00	Jumper Resistor			
J120,123	ERJ3GEY0R00	Jumper Resistor			

REF.NO.	PART NO.	DESCRIPTION	REF.NO.	PART NO.	DESCRIPTION
POWER BOARD			COLOR CCTV CAMERA WV-CL354		
PCB6 (NLA)	YWVKYCL32PBA	Printed Circuit Board Assy	MISCELLANEOUS		
IC1	M5237L	IC	E101	YW4051BYF3P	3-pin Terminal
IC2	YWTC4511F	IC	M1	YWV5BA0082A2	Front Escutcheon
Q1	25K612	FET	M2	YWVAKA0920AN	Head Optical Assy
			M3	YWV2SA1B51A1	Main Mounting Angle
D1	SS1.5J4	Diode			
D2,3	YWF1H47P	Diode	M4	YWV4JA0262A4	Spring
R1	ERJ3GEYJ221	Carbon 220 ohms 1/16W	M5	YWV1EA0127A4	Special Screw
R2	ERJ3GEYJ471	Carbon 70 ohms 1/16W	M6	YWV1EA0128A4	Special Screw
R3	ERJ3GEYJ223	Carbon 22K ohms 1/16W	M7	YWV3FA0101A3	Ring
			M8	YWBC-2B	Body Cap
R6	ERJ3GEYJ332	Carbon 3.3K ohms 1/16W			
R10	ERJ3GEYJ471	Carbon 470 ohms 1/16W	M10	YWVSWD1194A4	Right Side Panel
R20	ERJ3GEYJ104	Carbon 100K ohms 1/16W	M11	YWVSWB1195A4	Left Side Panel
VR1	EVM7J5W30853	Variable Resistor 5K ohms	M12	YWV5EA0976A2	Bottom Cover
C1	YWSX102K5VB	Ceramic 1000 pF	M13	YWV2HA0970B2	Shield Parts
			M14	YWV5KA1126A2	Case
C2	ECST1VX105ZR	Tantalum 1 μ F 35V	M15	YWV6EA0142A3	Lid
C3	YWSF104Z2VB	Ceramic 0.1 μ F	M18	YWV2KA0655B2	Rear Chassis
C5	YW400A123XK5	Ceramic 0.12 μ F	M19	YWV5WA1204A4	Rear Panel
C6,7	ECEA1EGE101	Electrolytic 100 μ F 25V	M20	YWV5BA0083A3	Rear Escutcheon
C9	ECEA1AGE221	Electrolytic 220 μ F 10V	M22	YWV5EA0975A2	Upper Cover
C11	ECEA1EGE101	Electrolytic 100 μ F 25V	M23	YWV5GA0114A4	Cap
C12	ECEA1AFS331	Electrolytic 100 μ F 10V	M24	YWV2TB0240A3	Mounting Bracket
L1	YWCD75101KC	Coil 100 μ H	M25	YWV2NA0199A4	Spacer
T1	ETE11K10AY	Power Transformer	M26	YWV7MA0270A4	Safety Label
F1	YWSFR1A	Current Fuse 1A	M27	YWV7SA1197A4	Fuse Label
J4	ERJ3GEY0R00	Jumper Resistor	M28	YWV7SA1338A4	Label
CN1	YW21746360	20-pin Connector	M29	Not Supply	UL/CSA Label
CN2,3	YW11746356	16-pin Connector	M30	YWV7QA2481A4	Main Label
CN4	EMCS0350Z	3-pin Connector	M32	YFV2NA0084A4	Spacer
			M33	YWV2PA0207A4	Insulator Sheet
			M34	YWV7SA1335A4	Operating Label
			M35	YWV1KA0128A4	Washer
			M36	YWV3AA0129A4	Dust Proof Parts
ACCESSORY PARTS/PACKAGING PARTS					
CN110	YFE4191J100	ALC Connector			
M41	YWVBQA2561AAN	Operating Instructions			
M42	YWV7SA1450A4	Caution Label			
M43	YWT050803	Polyethylene Bag			
M44	YWT20X35C03	Polyethylene Bag			
M46	YWV9CA1685AN	Packaging Assy			

REF.NO.	PART NO.	DESCRIPTION
DRIVE BOARD		
PCB1	YWVKBCL35E1A	Printed Circuit Board Assy Refer to replacement parts list for WV-CL350
DIGITAL BOARD		
PCB2	YVWKCL35E1A	Printed Circuit Board Assy Refer to replacement parts list for WV-CL350
SYNC / ENCODER BOARD		
PCB3	YVWKDCL35E1A	Printed Circuit Board Assy Refer to replacement parts list for WV-CL350
REAR BOARD		
PCB4 (NLA)	YWVKYL354P2A	Printed Circuit Board Assy
D1	LN277RPX	LED
R1	ERDS2TJ750	Carbon 75 ohms 1/4W
R4	ERDS2TJ751	Carbon 750 ohms 1/4W
C1	RPE132F104Z	Ceramic 0.1 μ F
C2,3	ECEA0JK531	Electrolytic 330 μ F 6.3V
C4	ECEA0JU471	Electrolytic 470 μ F 6.3V
C5,6	ECKF1H222MD	Ceramic 2200 pF 50V
SW1	YVSS55912L4	Slide Switch
SW2-6	YFKHH10914	Special Switch
CN1	YW41746436	16-pin Connector
ALC BOARD		
PCB5	YVVKYCL32P3A	Printed Circuit Board Assy Refer to replacement parts list for WV-CL350
POWER BOARD		
PCB6 (NLA)	YVVKYCL32E7A	Printed Circuit Board Assy
Q1	Z5C3568KL	Transistor
Q2	Z5D471KLA	Transistor
D4	YWF1H4TP	Diode
D7	D25B40	Diode
D8	YWRD4.3EB12	Diode
D9	1S555	Diode
R1	ERJ8GCSG153	Carbon 15K ohms 1/8W
R2	ERD50TJ333	Carbon 33K ohms 1/2W
R3,4	ERJ8GCSG151	Carbon 150 ohms 1/8W

REF.NO.	PART NO.	DESCRIPTION
R5	ERJ8GCSG821	Carbon 820 ohms 1/8W
R7	ERJ8GCSJ471	Carbon 470 ohms 1/8W
C1	ECQV1H474JZ	Plastic 0.47 μ F 50V
C2	ECQM1H683JZ	Mica Capacitor 0.068 μ F 50V
C3	ECQM1H333KZ	Plastic 0.033 μ F 50V
C5	DE7100F222MV	Ceramic 2200 pF
C6	ECEA1HGE101	Electrolytic 100 μ F 50V
C7	ECEA1HGE010	Electrolytic 1 μ F 50V
C14	ECEA1HGE101	Electrolytic 100 μ F 50V
T1	YWSU9V07010	Power Transformer
T2	ETE19K89AY	Power Transformer
F1	XBA1C20NU100	Current Fuse 2A 125V
CN2	EMCS0250Z	2-pin Connector
E1,2	S-N5057	Fuse Holder
M16	YVW7DA0284A4	Heat Sink
POWER SUB BOARD		
PCB7 (NLA)	YVVKYL324P5A	Printed Circuit Board Assy
IC1	YWUPC1093J	IC
Q6,7	P525011KL	Transistor
D1-3	YWF1H4TP	Diode
R17-20	ERJ8GCSJ912	Carbon 9.1K ohms 1/8W
R21	ERJ8GCSG271	Carbon 270 ohms 1/8W
R22	ERJ8GCSJ471	Carbon 470 ohms 1/8W
R23	ERJ8GCSJ392	Carbon 3.9K ohms 1/8W
R24	ERJ8GCSJ222	Carbon 2.2K ohms 1/8W
R25	ERJ8GCSG151	Carbon 150 ohms 1/8W
R26	ERJ8GCSG302	Carbon 3K ohms 1/8W
C11	YF4263232LJ5	Ceramic 3300 pF
C19	ECEA1CGE101	Electrolytic 100 μ F 16V
C20	ECEA1EGE101	Electrolytic 100 μ F 25V
C22	ECEA1AGE221	Electrolytic 220 μ F 10V
C23	ECA1HX5010	Electrolytic 1 μ F 50V
CN1	YW11746360	16-pin Connector
E1	JM16LH04AAT	4-pin Connector
E2	JM18LH04AAT	4-pin Connector
ACCESSORY PARTS/PACKAGING PARTS		
CN110	YFE4191J100	ALC Lens Connector
M41	YVW8QA22561AN	Operating Instructions
M42	YVW75A1450A4	Caution Label
M43	YWT050803	Polyethylene Bag
M45	YWT20X35C03	Polyethylene Bag
M46	YVW9CA1686AN	Packaging Assy

Parts Change Notice

Subject : Correction
Model No. WV-CL350
Effective From : ALL

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

Reason for Change ⁺ The circled item indicates the reason. If no marking, see the Notes in the bottom column.	
1. Improve performance	
2. Change of material or dimension	
3. To meet approved specification	
4. Standardization	
5. Addition	
6. Deletion	
⑦ Correction	
8. Other	

Interchangeability Code ⁺⁺ The circled item indicates the interchangeability. If no marking, see the Notes in the bottom column.	
Parts	Set Production
A Original New 	Early Late
Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.	
B Original New 	Early Late
Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.	
Ⓒ Original New 	Early Late
New parts only may be used in early or late production sets. Stock new parts.	
D Original New 	Early Late
Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.	
E Other	

Part Number		Parts identified by Δ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by o mark are now parts used from this Parts Change Notice.			
Ref No.	Original Part No.	New Part No.	Notes (+, ++)	Part Name & Descriptions	Price
POWER BOARD					
T1	YWPCIW19	YWFC061	7, C	Filter	
CF1	YWFC061	Deleted	7, C		
T2		YWPCIW19	7, C	Power Transformer	

File this Parts Change Notice with your copy of the Service Manual.

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Parts Change Notice

Subject: Correction

Model No. WV-CL354E

Effective From : ALL

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.
If new part numbers are shown, be sure to use them when ordering parts.

Reason for Change		+ The circled item indicates the reason.	
1. Improve performance			
2. Change of material or dimension			
3. To meet approved specification			
4. Standardization			
5. Addition			
6. Deletion			
7. Correction			
8. Other			

Interchangeability Code		++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column.	
Parts	Set Production		
A	Original → Early New → Late	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.	
B	Original → Early New → Late	Original parts may be used in early production sets only. New parts may be used in early or late production sets. Use original parts where possible, then stock new parts.	
C	Original → Early New → Late	New parts only may be used in early or late production sets. Stock new parts.	
D	Original → Early New → Late	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.	
E	Other		

Part Number		Parts identified by mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by a mark are new parts used from this Parts Change Notice.			
Ref No.	Original Part No.	New Part No.	Notes (+, ++)	Part Name & Descriptions	Price
Power Board					
PCB6 (NLA)	YVVKYCL32E7A	YVVKYCL32P7A	7, C	Printed Circuit Board Ass'y	

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Parts Change Notice

Subject : Correction of Parts Change Notice
Model No. WV-CL320/CL350 Series
Effective From : Serial No. 2ZB00001

Please revise the original parts list in the Service Manual to conform to the change(s) shown herein.
If new part numbers are shown, be sure to use them when ordering parts

Reason for Change		+ The circled item indicates the reason	
1. Improve performance			
2. Change of material or dimension			
3. To meet approved specification			
4. Standardization			
5. Addition			
6. Deletion			
7. Correction			
8. Other			

Interchangeability Code		++ The circled item indicates the interchangeability. If no marking, see the Note in the bottom column.*	
Parts	Set Production		
A Original	Early	Original or new parts may be used in early or late production set. Use original parts until exhausted, then stock new parts.	
New	Late		
B Original	Early	Original parts may be used in early production sets only. New parts may be use in early or late production sets. Use original parts where possible, then stock new parts.	
New	Late		
C Original	Early	New parts only may be used in early or late production sets. Stock new parts.	
New	Late		
D Original	Early	Original parts may be used in early production sets only. New parts may be used in late production sets only. Stock both original and new parts.	
New	Late		
E Other			

Part Number		Parts identified by ■ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts. Parts identified by o mark are new parts used from this Parts Change Notice.			
Ref. No.	Original Part No.	New Part No.	Notes (+, ++)	Part Name & Descriptions	Price
MISCELLANEOUS					
C22	ECEA1AKG101	ECA1AKF820	1, C	Electrolytic 82 μ F / 10V	
C25	ECEA1AKG101	ECA1AKF820	1, C	Electrolytic 82 μ F / 10V	

File this Parts Change Notice with your copy of the Service Manual

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